ELECTRICAL REVIEW

[ILLUSTRATED.]

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Induction Suppressor.

THE JACKSON & CHAMBER'S METHOD AND APPARATUS FOR SUPPRESSING INDUCTION DISTURBANCES IN TELEPONE CIRCUITS.

This invention is based on the fundamental idea that effective suppression or neutralization of the disturbing currents caused in telephone lines by induction from external sources can only be attained (without simultaneous suppression of the talking currents) by a neutralizing force created by the disturbing currents themselves, for only in this way can a neutralizing force be had which will in all cases be exactly like the disturbing currents both in strength and character.

This principle is carried into practice by causing the disturbing currents, as they flow in the line, to inductively charge an insulated metallic body, usually in physical contact with the convolutions of a coil of wire which forms part of the line.

The construction of the best form of apparatus which have yet been made by the inventors, is illustrated in the accompanying cuts, taken from the process patent, No. 322,728.

The foundation of the coil is a piece of soft iron, *B b*, for which malleable iron is the best. At each end of the body, *B*, are two broad lugs, *b*. Around the body, *B*, is wound an insulated soft iron wire, *D*, which is usually left in open circuit. The primary, *P*, and secondary, *S*, are wound over the body, *B*, and wire, *D*, passing between the lugs, *b*. Over the secondary, and at an angle therewith, is wound an insulated iron wire, *H*, which is also usually left in open circuit. *L L* represent the line and ground wires, and *T* a Blake transmitter.

W is a wooden cap, used to finish the ends of the coil.

The coil is connected in a telephone exactly as in the ordinary induction coil used with battery telephones.

The wire *D* underlies the primary and becomes really the core of the induction coil, and takes off from the iron, *B b*, to a very great extent, the electrical influence of the current flowing through the primary.

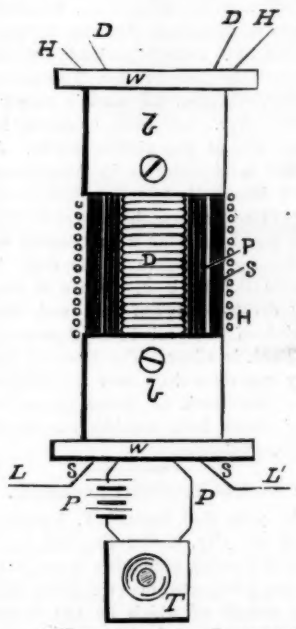
As the currents flowing through the line come into the secondary, they tend to cause induced electrical charges in the iron, *B b*, and also in the outer wire, *H*. These currents vary in tension, the dis urbing currents being usually of much higher tension than the talking currents, and therefore the disturbing currents perform this work of inductively charging the iron, *B b*, and induce therein electrical charges of opposite polarity to the disturbing currents, and these induced charges react inductively upon the line, and thus neutralize the currents which caused them, without affecting, except to a slight extent, the talking currents.

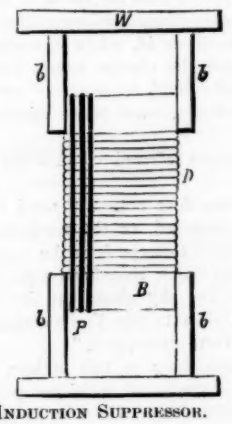
As to the practical operation of this invention we quote from a letter written by the manager of a telephone company, omitting the names of the cities between which the tests were made :

"The line over which these tests were made is about 30 miles long, on which is strung two No. 8 soft iron wires. This line runs parallel for about eleven miles within one foot of the line of seven Mutual Union Telegraph lines, which are in use all the time, and are heavily charged with battery and dynamo currents.

"After the electric lights in the cities of —— and —— are started up, it has been impossible for us to do any business over these wires, but using your coils it decreases the induction and other electrical disturbances to a minimum.

"We first connected your coils on the lower wire, as the induced currents naturally flow toward the earth, and we thought it would be a more severe test ; we then talked on this line, having other parties talking simultaneously over the other wire ; whereas they could hear our talking by induction as usual, it was impossible for us to recognize any conversation of the other parties, although we could hear a slight whispering noise, but the conversation was not audible. As near as I can judge the cross-talk was decreased 95 per cent., while the electrical disturbances of the electric light and other induction fully 90 per cent."





Figs. 1 and 2.—Jackson & Chambers' Induction Suppressor.

Four mechanical patents and one process patents were issued on July 21st, to cover this invention, and the best summary of it which we can give is contained in the claims of the process patent, viz. :

1. The herein described method or process of neutralizing induction disturbances in a telephone circuit, consisting in opposing the disturbing currents by induced charges generated by said disturbing currents and reacting upon said disturbing currents.

2. The herein described method or process of neutralizing disturbing currents in a telephone circuit, by establishing an equilibrium between said disturbing currents and electrical charges of opposite polarity, inductively generated by said disturbing currents.

The inventors, Messrs. Jackson and Chambers, reside in Detroit, the former the well-known General Manager of the Telephone and Telegraph Construction Company, of Michigan.

It is stated that the tin deposits of Alabama cover over eight thousand acres of land.

Some Curious Electrical Facts and Theories.

C. C. Haskins.

During the heated term, after the broiling summer sun has done its daily work and gone to rest, there often appears in the distant horizon almost constant flashes of indefinite light, covering large areas of sky ; sometimes spreading high in the heavens, producing a brilliant illumination of a subdued character. Usually there is no definite form as in a thunder bolt, no forked or chain appearance, yet the flashes succeed each other with astonishing frequency, continuing at times for hours. Unlike ordinary lightning such a display does not usually presage a storm, but maintains the character which the ancients sometimes called "innocent lightning," inasmuch as it is generally unaccompanied by the faintest trace of thunder.

That these displays are purely electrical has never been disputed, and if other than ocular proof of this identity were required, one has only to listen at a telephone to be convinced by the induced sounds heard at every flash, however distant these may seem to be.

Heat lightning, or its equivalent, is the generally accepted name of this form of discharge, in nearly or quite every language ; and while there are other quite similar manifestations of electricity, such as St. Elmo's fire, brush lighting, etc., in certain localities and under peculiar circumstances, and under others, polar auroras, yet these are comparatively of less frequent occurrence, and hence less generally known.

There have been repeated and quite varied attempts at an explanation of these silent light flashes, and they have been divided into two classes : those which occur during an overcast or clouded sky, and those which make their appearance during a season of unclouded heavens.

The great astronomer Arago suggested the use of the polariscope for distinguishing between original and reflected light in these displays, for in many instances the discharges of ordinary lightning during a storm below the observer's horizon, and beyond the range of his hearing, may be reflected in such a manner as to seem to originate where seen, and that this is true to an extent has been proved by telegraphic communication between points where a storm was in progress, and a distant point where flashes of heat lightning were visible to the observer. These cases, however, do not cover the whole ground, and hence this explanation does not satisfy the requirements of the problem of lightning flashes from a clear sky, or from a single small cloud high in air, surrounded on every side by clear heavens.

The ancients had very peculiar notions of electricity in whatever form manifested. The aurora, for instance, was looked upon as an evidence of Divine anger, an augury of dire calamity, inasmuch as it was a display of the everlasting fire of wrath, the outer gateway of which was temporarily removed that the true inwardness of the place of punishment might be seen of men.

No less peculiar were their attempted explanations of heat lightning, among which may be mentioned that of Descartes, who claimed that they were exhalations passing between clouds, while Harison and Barberet compared the phenomena to that of the explosion of powder, which, when unconfined, is noiseless, and that electricity, unconfined by clouds, would obey the same law of explosions. Muschembroeck assumed that heat lightning is produced by the burning of exhalations at an altitude beyond the possible existence of clouds. Others have assumed that a chemical resolution of water contained in the clouds releases the hydrogen, which takes fire, and burns without noise. Matteucci reasons that these lights are but the restoration of equilibrium between the potentials of air and earth, through the medium of a moist atmosphere induced by excessive heat and consequent evaporation. Delarine, that the phenomena are due to the mixture of masses of air at various altitudes between the earth and the upper atmosphere, in which currents are generated by heat or through the effect of winds.

It has been doubted by some eminent writers on the subject if, as has been repeatedly claimed, there are in reality any well-authenticated instances of heat lightning originating in a perfectly clear sky ; yet the number of observers who assume to have witnessed these displays would seem to verify the fact, and place it beyond controversy. While it is true that in a large majority of instances there are more or less clouds in all skies, there would seem to be no reason for assuming that these are a necessity for a display of electric force, which makes itself apparent in such an infinite variety of forms. A static machine, in a dark room, shows a luminous, noiseless escape from various points, and the Geissler illumination is equally silent, yet there is no cloud medium or generator in either instance. And, again, the aurora in a clear night often assumes so close a resemblance to cloud forms as to be readily mistaken for an aggregation of atmospheric vapor.

If a large Geissler tube be charged from a static machine, a separation of this from the prime conductor will extinguish the light; but, by bringing the finger close to the surface of the tube, the illumination at once becomes apparent, and a flash similar to that of heat lightning is exhibited. We know, too, that thunder tones are, as a rule, deep, showing coarse vibrations, and it has been suggested as possible that there may be thunder tones so low in the musical scale as to be

beyond the capacity of the human ear. In that case, no matter how much tone force an electrical explosion might be possessed of, the human auditory nerve would be incapable of recording it.

But it hardly seems necessary to travel so far in search of an explanation of the phenomena as ordinarily witnessed. Cases are not rare where exhibitions of similar electrical phenomena, or at least nearly similar enough to afford a clue, are recorded, where these have been near enough to the observer to preclude the possibility of mistake. In a communication to the French Academy in 1881, M. Trécul, speaking of these peculiar electrical phenomena, says: "I have, in fact, quite often, at the height of the first floor of my residence, seen the entire width of Linné street, which is a spacious roadway, thus illuminated. I have only noticed this during the day. The light is very feeble, of a yellowish tinge, and far from being as vivid as ordinary storm lightning. Sometimes this light assumed the form of a large, luminous sheet, several meters wide, and again it would cover an extent of only one and one-half or two meters; at other times it was reduced to a strip of only 40 to 50 centimeters wide, which extended only partially across the street." M. Trécul remarks that these manifestations were as instantaneous as those of lightning proper.

The late Count du Moncel, in *La Lumiere Electrique*, from which journal many of the above facts are taken, says: "Personally I believe, with Matteucci, that silent lightning arises simply from the interposition of secondary aeriform conductors, more or less rarified, through which a gradual discharge is effected. Through these media the equalization of potential is accomplished without noise, because there is but little resistance to be overcome, and yet the conductivity is not perfect enough to accept the entire discharge, and this is rendered luminous in consequence."

Another phenomena, less frequent than heat lightning, is no less interesting and curious, yet equally well authenticated. This is thunder without lightning. This, according to M. Poey, who has investigated the matter more thoroughly, probably, than any living writer, may occur in a clear sky, an overcast sky, or in a densely clouded firmament, and cites a long list of observers who have chronicled instances from the days of Horace to the present time.

Among these, Descartes offers an explanation, in accordance with his theory of "exhalations," that where these are of a non-inflammable nature, their escape from one cloud to another, while capable of producing detonations, would be powerless to produce flame; while Muschembroeck assumes that the density of the clouds in which these explosions occur form opaque curtains between us and the flashes, and so hide them from mortal vision. Another writer has a more complicated theory. According to him: "When, from reduction of temperature or any other cause, the air gives up a portion of the moisture contained therein, the aqueous vapor, condensing into a liquid form, augments the electrical intensity, because the electricity which pervades all vapor in space concentrates immediately upon the outer surface of the water globules. When the difference of intensity is very great, and the mass so distributed is considerable, a discharge is produced, and the flash is followed by a thunder clap; but if the difference of intensity in the globules is not considerable, then thunder is heard, but no flash is visible."

Poey, following Peltier, explains the fact of the sudden formation of a dense cloud in a clear sky, immediately after a heavy thunder clap, by assuming that particles of vapor sufficiently attenuated to render them invisible, are suddenly aggregated by an explosion which, in consequence of the nearness of the globules, gives forth no light. In this case, which Du Moncel contests, there must necessarily be an inductive influence at work to provoke the discharge, and the succeeding noise (the discharge, in itself, being noiseless, because of the absence of resistance) arises from the sudden condensation of the medium of discharge. Certain it is, at any rate, that these suddenly formed clouds are quite frequently developed into rain clouds, throughout the prairies of the West, and furious, sudden shower is thus not infrequently the result of one of these almost instantaneous aggregations in an apparently clear sky.

The theory of M. Jobard is peculiar if not tenable. He assumes that there is a constant upward flow of gas of an inflammable nature, particularly from collieries, marshes, and from the decomposition of organic matter, which does not mix with the air, but passes upward like oil in water, because of its inferior specific gravity, until it reaches a point of equilibrium in the upper air. Yet this may be arrested in the upward flight and imprisoned by the clouds, contributing to the lightness of these as they float. This gas, when combined with air, forms the deadly fire-damp of coal mines, and requires but a spark to produce an explosion. Held enveloped in the body of a cloud, from absorption, it becomes thus an explosive element which the tiniest electrical spark will fire while held suspended between two clouds, a spark discharge from one of these to the other will produce the same effect. This explosion, according to Jobard, constitutes thunder, but if the gas be unconfined, at a height to which it is capable of rising, and there ignited, the vivid flash might be seen, while the conditions of freedom from restraint are such that no audible sound would reach the earth from the high altitude, where, in addition to the distance the air is so rarified as to carry sound vibrations but imperfectly.

Now, if M. Jobard is right in this matter, how happens it that all this mass of inflammable gas for so many hundreds and thousands of years has been escaping from the earth in such quantities, and yet manages to avoid ignition where it certainly should be most dense and dangerous—at the earth's surface. If only he had added to this theory some means of aggregating the gas, condensing it in the upper air by some species of attraction or cooling, without increasing its density, then, perhaps, we might accept his philosophy. But, if like all other gases escaping upward from the earth, it becomes more and more dilute as it rises and expands, it would loook as if, when it reached the level assumed, the charge would hardly be concentrated enough for one good sample of summer thunder, even when omitting the flash.

In the extract referred to, M. Jobard concludes:

"The storm does not cease until the fire-damp is exhausted, or the rending of the cloud permits its escape into the upper air; for no sooner has a hole been made in the cloud than the sky clears up the gas, is freed, and rises to the limits assigned by scientists to our atmosphere"

Clouds, according to this author, would seem to be a species of aerial octupus, with suicidal inclinations. They lie in wait for errant gases which they imprison until opportunity occurs—then set them on fire, blowing themselves into fragments, only to rele se their prisoners in so doing.

There is still another form of lightning which has puzzled scientists, perhaps more completely than either of those mentioned, but which is, perhaps, more rare than either. These are discharges which leave behind them luminous lines of light, which assume various forms and colors. M. J. Faivre d' Esnans says that about 1843 he witnessed several of the form known as "persistent train lightning." He relates how, being called one morning in September, to visit a sick person, he started about six o'clock to cross a mountain and make his visit. The sun was hidden by the morning mist, and a dense fog enveloped him. Arrived at the summit, he beheld a heavy black cloud rising from the south, surrounded by diffuse gray clouds. Huge raindrops now commenced to fall, "as large as a five-franc piece," accompanied by terrific bursts of thunder. Following his dog, he took refuge beneath a hazel hedge, from which he witnessed the storm per force. The storm area covered a space, as was afterward ascertained, of about twenty leagues. Lightning fell constantly, and generally in right lines, while occasionally the bolts were divided into two or three branches—but in several of the heaviest of these discharges, accompanied by the loudest reports, the electricity left in its track quantities of sparks of a reddish color. These discharges, of which he saw several, were in a direct line, without any zig zag variation, in every case.

Another observer records his experience in an English journal, his statements pertaining to a storm which broke over London in June, 1858. He says that, independently of lightning, which flashed in long, sparking lines, disappearing immediately, without leaving any trace, he saw several which left a luminous track, which remained for some time, and which did not at the last disappear suddenly, but gradually faded into extinction, after having assumed a granular form, but without changing the general shape of the line of light. Some of the latter of these discharges assumed the form of a string of luminous beads, rather than a direct line of illumination, the various points of light appearing to show several degrees of light intensity.

European Coin and Bullion.

The great banking institutions of Europe appear to be well off in the matter of specie. At last mail dates the leading banks had the following amounts in their vaults:

Bank of England, May 27	£26,842,000
Bank of France, May 28	86,535,000
Bank of Germany, May 23	80,227,000
Austro-Hungarian, May 23	19,471,000
Netherlands Bank, May 16	11,166,000
Bank of Belgium, May 21	3,817,000
Bank of Russia, May 7	28,375,000
Bank of Spain, May 16	7,700,000
National Bank of Italy, May 10	8,227,000
Total	£222,403,000

In American money, this sum represents $1,112,015,000. There is probably $888,000,000 more in the United States. This accounts for $2,000,000,000 of the world's supply of gold and silver. European countries have the best half of the visible supply. Just how much specie there is in Asiatic countries it is impossible to tell. Millions upon millions of silver have been sent to China and the East Indies, but what becomes of it is the unsolved problem of the day. The bullion in the Bank of France is nearly equally divided between gold and silver. Two-thirds of the specie in the Austro-Hungarian Bank is silver. The National Bank of Italy reports a little over £1,000,000 in silver. The Bank of Germany and the Bank of Russia have considerable silver in their specie balances.

An Ancient Electrical Landmark.

In the year 1846, Samuel T. Armstrong, Esq., of this city, visited England for the purpose of learning something of gutta percha, a newly imported material from Singapore, a sample of which he had received from London with an invitation to visit that city. Upon his return to New York he brought with him a quantity of the crude gum, then known as *gutta taban*, and in the fall of 1846, immediately commenced the erection of machinery for the manufacture of various articles of gutta percha.

In the following year the works removed to the city of Brooklyn and produced water and gas pipes, shoe soles, machinery bands, sheets, stamped goods, picture frames, doll heads, etc. During this year, Mr. W. W. Marks, the present superintendent of the company's works, and nephew of Mr. Armstrong, acting under his direction, experimented with India rubber to cover telegraph wires but was not successful. Satisfying themselves that the new article—gutta percha—was a non-conductor of electricity, machinery was procured and put up in their Brooklyn factory for the purpose of covering telegraph wires.

The first wire covered was a No. 9, insulated with gutta percha to a diameter of $\frac{7}{16}$ of an inch, and was laid across the North River at Fort Lee, under the supervision of Mr. Marks.

When laid and the shore ends connected, it was tested and declared as answering the purpose satisfactorily.

This was the first wire cable insulated with gutta percha that was ever made or used, for it was fully one year after this successful operation in the United States that the discovery was made in England.

It too frequently is the case in the States, and may partially be due to the fact that an acknowledgment of the merit is smothered by the selfish aims of foreign interests, that the application of new discoveries are awarded to other nations.

We are pleased to state that our country, through the founder of the Bishop Gutta Percha Works, stands first and foremost in the advancement of the many uses of gutta percha, and that the world is now realizing the blessings from the labors of Americans, in the introduction and successful application of gutta percha as a perfect insulation.

Gutta percha still stands in the front rank of insulating compounds. Mr. Armstrong was succeeded in the year 1851 by Mr. Samuel C. Bishop, who became the sole proprietor and only manufacturer in the United States of gutta percha insulated telegraphic wires, cordage and cables, and pure gutta percha goods, which business he conducted until the time of his death in the year 1872. The business increased so rapidly that in 1863 it was found necessary to erect from designs made expressly for that purpose, the complete factory which occupies the premises Nos. 422, 424, 426 East 25th street, East River. It is bounded on the eastern and western sides by huge tanks, capable of holding 30 to 50 miles of submerged armored cable.

Now that it was deemed advisable to meet the increasing demand for the superior productions of these old reliable works, and not prudent for any one individual to assume the responsibilities of so large a concern, it was found necessary and by mutual consent, to sell the entire business of the Bishop Gutta Percha Works.

This transaction was arranged, the business sold and transferred to a corporate company, to be known hereafter as the Bishop Gutta Percha Company.

Samuel Boardman, Esq., was duly chosen President, and will retain his office at No. 155 Broadway.

Mr. Henry A. Reed, brother-in-law of the President, was selected as the Secretary.

During all these many years and the changes consequent upon the death of the principals, Mr. W. Willoughby Marks—who became connected with the works from the inception of the enterprise—has occupied and satisfactorily discharged the duties of the important position of superintendent, and for the past thirteen years has had the entire management of the works. He will be continued as the superintendent of the manufacturing department, to whom all communications relating to the same, and all orders, as heretofore, should be addressed. The office and salesroom is being considerably enlarged and handsomely refitted, and will occupy the same position in the works, the entrance being at No. 422.

Mr. Marks has devoted a number of years to experimenting in the construction and perfection of machinery for the insulating of wires, the stranding of cables, etc., some machines of which are entirely new and superior to any in the old world for similar work.

Those contemplating the introduction of new applications and uses for gutta percha, would do well to avail themselves of the facilities afforded by these complete works and the experience of its accomplished superintendent. Mr. Marks will be ably seconded by his son, Mr. W. Wolcott Marks, as assistant superintendent and general traveling agent.

He is well versed in every detail, having been connected with the works for nearly eighteen years, and is competent to represent the new concern.

The Bishop Gutta Percha Company will continue the manufacture of gutta percha, Marks' Compound and Balata insulated wires, cords and cables for telegraphic, telephonic and all electrical purposes, as well as every description of pure gutta percha goods, for the excellence of which they have become universally known.

They are prepared to supply all the demands of the electrical world requiring their productions, and guarantee their manufactures to be equal, and in many respects superior to any wires and cables now manufactured.

It is hoped that the thorough and systematic manner in which the business of the past was conducted, will insure these works in the future a continuance of the long and pleasant business relations, and they propose by sterling enterprise and renewed exertion to merit and receive a largely increased patronage. The well-wishes of the ELECTRICAL REVIEW are with the Bishop Gutta Percha Company.

Electric Time.

The Providence Sunday *Star*, after quoting at some length from the ELECTRICAL REVIEW's article on electric time, says:

"No business can be properly nor systematically conducted without frequent reference to its element of time, and the greater the accuracy the better. The practical needs are abundantly indicated in mercantile transactions, in the business of bankers and brokers, in manufacturing establishments, in general, State, and municipal government departments, and in residences, correct time is not only a luxury, but an indispensable convenience.

"The vice-president and general manager of the Telegraphic Time Company is Mr. J. W. Duxbury, whom about every business man in Providence knows and likes. The Board of Trustees comprise Messrs. Alfred Ray, R. M. Pulsifer, Alfred A Reed, Henry Howard, C. R. Weeden, F. E. Spooner, C. H. Pond, James Hamblet.

"The officers of the Electric Time and Messenger Company, of this city are: J W. Duxbury, president; R H. Whittier, treasurer; P. J. Hurlburt, secretary; C. G. A. Peterson, superintendent.

Bringing Him Back to Life.

A country editor lay in an unconscious condition, and for some time it was feared that he was dead.

"Can't you rouse him, doctor?" was anxiously asked.

"No," the physician replied, "I fear that life is extinct."

Then the editor's assistant bent over and whispered in his ear:

"A gentleman wants to put an advertisement in the paper."

Immediately the unconscious man's face showed signs of returning life, and struggling to a sitting posture, he said feebly:

"How many lines?"

—— The Municipal Council of Moscow, in Russia, are making enquiries with a view to eliciting the best means to be adopted for the proper and efficient lighting by electricity of that city.

—— There are two rival telegraph offices in a little New Jersey village, and the operator in one has monopolized the business by a clever inducement which he offers to the thirsty public. He gives a glass of ice-cold soda water to every person who sends a dispatch.

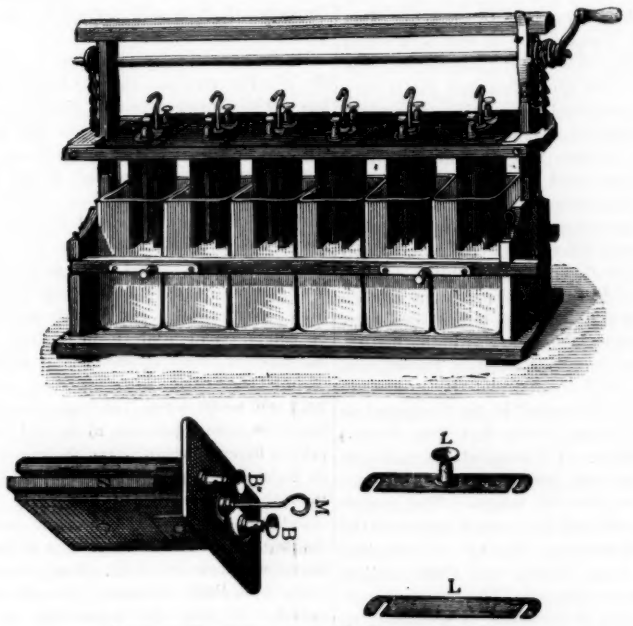
—— Many efforts have been made to ascertain the E.M.F. of the retina and nerve of the eye, and to learn whether this quantity undergoes any alteration under the action of light. Some recent experiments have demonstrated the fact that the action of light is such as to vary the amount of electromotive force to the extent of about 3 to 7 per cent of the total force. A strong flash of light enduring for the fractional part of a second produces, therefore, a marked effect.

—— At a recent meeting of the City Commission of Sewers, London, it was moved that, having regard to the repeated failures of private companies to supply electricity, it was desirable that the commission should undertake street lighting by electricity, and that it be referred to the Streets Committee to select a small area and obtain estimates of cost of installation. An amendment was proposed and carried that the whole subject should be referred to the Streets Committee.

The New Grenet Plunge Battery.

The cut on this page represents a new and very convenient arrangement of the well-known Grenet plunge battery, the special feature of which is the attaching and interconnecting arrangement of the electrodes, so that any number of cells from one to six can be used, and can be connected for either quantity or tensity. When the plates are raised out of the solution the battery may be allowed to remain for weeks without needing any attention, and is always ready to produce a powerful current whenever wanted. Such a battery is invaluable to teachers, lecturers, experimenters, and for many other practical purposes when powerful currents are needed for a short time. Strongly and compactly built, as is apparent from the cut, the battery is easily manipulated. The solution used is the ordinary bichromate solution, same as is used in the Grenet. This solution is capable of great improvement by the addition of about 10 per cent. nitric acid.

The cut represents this new dipping battery No. 2, manufactured by J H. Bunnell & Co., and is composed of six cells of glass, $3\frac{1}{2} \times 4 \times 6\frac{1}{2}$ inches, the carbon plates being



PLUNGE BATTERY OF J. H. BUNNELL & CO.

$5\frac{1}{2} \times 2\frac{1}{2}$ inches, with wheel and ratchet for lifting and retaining out of acid. The hook *M* is for hanging any of the carbon plates to screw eye in top cross-piece, when not needed. *L* and *L* represent connectors, which are conveniently carried when not in use, on middle cross-piece, shown in cut. The battery, in its present form, has rapidly become a general favorite.

—— According to the *Proceedings* of the Institution of Civil Engineers, an electrical exhibition has been held at Turin, and important prizes have been offered by the Italian Government and by the City, of which the following facts have been communicated to the academy by M. H. Tresca: Messrs Gaulard and Gibbs have established between the exhibition, the station at Lanzo and intermediate stations, a circuit of eighty kilometers length, with a chrome-bronze wire, of 3.7 millimeters diameter. This wire is traversed by alternating currents produced by a Siemens machine of 30 horse power. The following lights were worked from the circuit with the intervention of Messrs. Gaulard and Gibbs' secondary or induction apparatus; at the exhibition, 9 Bernstein lamps, 1 Soleil lamp, 1 Siemens lamp, 9 Swan lamps, and 5 other Bernstein lamps at a short distance, all, however, needing very different electromotive forces. At the station of Turin-Lanzo, 10 kilometers distant, 34 Edison lamps of 16 candles, 48 of 8 candles, and a Siemens arc lamp. Later there were added at the station at Lanzo, 40 kilometers distant, 24 Swan lamps of 100 volts. The lighting was perfectly regular, and easily independently extinguished and illuminated.

A Battery Test.

A correspondent of the Boston *Herald* says: "In the Sunday issue of your paper of July 5 there appeared a notice of an interesting electrical test which was being made in this city, to prove whether or not the Kauffer-Goldner electric battery was able to light a circuit of incandescent lamps long enough to be practical for the ordinary purposes to which electric lights may be put The experiment was made under my own supervision, and was so arranged as to preclude the possibility of any interference on the part of interested parties. The test is now at an end, and the battery has far exceeded the expectations of conservative observers. On Tuesday, July 7, nine cells of this battery were closed in circuit with two eight-candle-power incandescent lamps, and so connected with an automatic clockwork that the current was closed for five minutes and thirty-eight seconds, and opened for six minutes. The whole battery and clockwork was then enclosed in a suitable case and sealed with wax seals; also every point in the conductors which could possibly be tampered with was fastened with a wax seal. The whole apparatus was so arranged that it was utterly impossible either to add anything to it or take anything away, or introduce any other electrical current in the circuit. The battery ran in this way, being automatically shut off and on from the lamp circuit from noon of July 7 till 10 o'clock A. M., July 20. During this period of 310 hours, the circuit had been closed and the lights burning for 151 hours. At 10 o'clock A. M., July 20, the battery was unsealed and examined, and found to be partly exhausted. The inner porous cups were then washed out and replaced, and at 11 o'clock A. M. on the same day the battery was again sealed up and the circuit closed, this time not off and on, but continuously. The lights in this way burned with unabated brilliancy. At 5 P. M. on the following day the circuit was broken, the lights having been burning continuously for 30 hours, in addition to the 151 hours already accomplished At 9 A. M. on the next day (July 22) the circuit was again closed until 5 P. M., the lights burning brightly all the while On the next day (last Thursday) the circuit was again closed from 9 A. M. till 5 P. M. On Friday, July 24, the circuit was closed at 9 A. M., but was opened at 2 P. M., at which time the incandescent lamps had begun to burn low, showing that the battery was exhausted. Upon opening the battery, it was found that the solution had been pretty well used up. The zincs were bright and clean, and had lost about one-seventh of their weight. Between 12 M. on July 7 and 2 P. M. on July 24, or during 408 hours, this battery of nine cells had lighted two eight-candle-power incandescent lamps for 202 hours, or about half the time. So far as it is known, this has never before been accomplished. In fact, there is no account of any battery that has ever continued to light an incandescent lamp for one-sixth of that time, and yet several gentlemen interested in such matters have this last week made statements to the effect that batteries had been or could be readily devised that would favorably compare with the test above described. If such results have heretofore been obtained, they are certainly unknown to the writer and to the majority of electrical people. It is believed that it would be very interesting to the public if parties who have ever made a battery of nine cells that would light two 8-candle-power incandescent lamps for 200 or 100 or even 50 hours without renewing the solution, would come forward and give an accurate and detailed account of their experiment.'

* * The lowest recorded temperature—393° below zero F.—has been produced by Olskewski, by vaporizing liquid nitrogen under low pressure. Liquid carbon monoxide gave 365° below zero, and liquid oxygen, 246½°. This is comforting reading these warm days.

* * A correspondent of the Little Rock *Gazette*, writing on the recent zinc discoveries in the State, says: "We are led to the belief that the lead found in Boone County is not the only one in the State, and are well convinced that Arkansas is just on the eve of a grand advancement on account of its mineral resources."

* * Fifty representatives, from as many barb wire manufactories, being three-fourths of all such institutions in the United States, held a secret meeting in Chicago last week, at which they virtually decided to form a pool and advance the prices 15 per cent. The different members contended that the selling price—$3.35 per hundred pounds—was 10 cents below the actual cost of production. They asserted also that the combination between Vanderbilt and the Pennsylvania-Central system of railroads would result in raising freight rates, and the only way to meet such increased rates was to advance the price of barbed wire and form a manufacturers' association to maintain the advanced prices.

* * We recently printed an article concerning Mr. Walker's application of the discoveries of Professor Lodge and Professor Clarke to the condensation of lead fume and other volatilizations met with in metallurgical works. A German contemporary, the *Bergund Huttenmannische Zeitung*, also published an article on the subject, which has called forth a letter in the issue of the paper of July 10 from B. Rosing, of Tarnowitz, stating that the original discovery of this action of electricity on dust is not by any means recent. It was known in 1850, when Guitard published his observations as to rapid condensation of tobacco smoke in a glass, by introducing into the glass one of the wires from an electrical machine. The writer of the letter also mentions Wiedemann's work on electricity, *Lehre von der Electricitat*, as referring to this in Vol. I., page 33. Although the discovery thus appears to be old enough, there does not seem to have been any practical application of it till Mr. Walker took it up.

* * According to our transatlantic namesake, Mr. Field said recently: Within two months the electric motors will be as complete a success on the elevated railroad in New York as horse cars are on Broadway. We are now laying rails for electricity between the tracks of the Second Avenue Elevated Railroad from Chatham Square to Harlem, and if we cannot run over the whole line, I am willing to acknowledge the thing a failure. Our trial proved that not half enough has been claimed for the electric motor. All electricians who have seen the motor work declare the problem solved, so far as the electrical part is concerned." We suppose that after the electrical propulsion of passenger cars has been successfully established in America for a few years, capitalists will be found in this country to pluck up enough courage to do something of a practical nature at home. Unfortunately, the English nation is generally behind others in the development of anything new and startling.—*London Electrical Review.*

Electrical Review.

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We invite correspondence from Electricians, Inventors and the Telegraph and Telephone fraternity and those engaged in Electric Lighting on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

Mr. J. Viennot, 150 South Fourth Street, Philadelphia, is our accredited representative for Pennsylvania.

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NEW YORK, AUGUST 8, 1885.

CONTENTS.

	PAGE
Induction Suppressor	1
Some Curious Electrical Facts and Theories	1
European Coin and Bullion	2
An Ancient Electrical Landmark	2
Electric Time	3
The New Grenet Plunge Battery	3
A Battery Test	3
Editorial Notes	4
The Electric Light in Europe	4
New Primary Batteries	4
General Western News	5
Richmond's Electric Light Contract	5
Telephonic News	6
The Telephone	6
Underground Conductors	6
Sale of Bankers and Merchants' Telegraph Co.	7
The La Rue Telegraph Key	7
Telegraphic News	7
Electrical and Scientific	8
Electric Light and the Gas Engine	8
The Western Delegates to the Electric Light Convention	8
The Jenney Electric Lighting System of Indianapolis	9
Electric Light News	9
Electrical Patents	10

We hope all our readers interested in electric lighting realize the importance of the meeting at the Union Square Hotel, August 18th, and will come prepared to furnish information as well as to receive it. Every electric light organization in the United States should be represented.

Contributions to the Grant Monument Fund come very promptly from electrical companies. The first donation recorded was for $5,000, and was from the Western Union Telegraph Company, closely followed by the gift of $1,000 from the Metropolitan Telephone and Telegraph Company, of this city.

The New York Electric Time Company have acquired the franchise and plant of the Time Telegraph Company in the cities of New York and Brooklyn, and on Long Island and Staten Island. The general offices of the company are at No. 15 Cortlandt street, where a fine exhibition of the time system can be seen. The new corporation is a vigorous one, and will push the business rapidly.

On our first page we describe the "Induction Suppressor" of Messrs. Jackson & Chambers. It will be of much interest to our readers in the telephone field, where induction has been a familiar and ever-present element of annoyance since the telephone came into use. Induction has also been the scapegoat, when no other was convenient or possible; "call it induction, and look wise," is a telephonic axiom of particular value to those who cannot readily explain the cause of the trouble with the telephone, and the man doesn't live who can explain *all* the mysteries, as discovered by the subscriber, of this innocent-appearing instrument. However, the telephone manager's experience which we publish, would indicate that the "Induction Suppressor" is properly named, and we hope it will prove of practical value to its capable inventors as well as to all workers with the telephone.

THE ELECTRIC LIGHT IN EUROPE.

The average American reader has but a meagre idea of what is going on in Europe in the way of pushing the electric light into prominence. In France, Belgium and England the progress of the electric light has now become exceedingly rapid. In public houses, restaurants, cafés and stores it has been found, as the ELECTRICAL REVIEW has often prophesied it would be—it has been found indispensable. The slight difference between the cost of this illuminant and gas is very properly considered as nothing where the general public is concerned. If the heat of a restaurant or store will prevent customers from entering, and the electric light will leave the atmosphere in a condition that is at least not any warmer than it is naturally, then the small difference of cost cannot stand in the way of the general adoption of this illuminant. But neither French nor English nor German can deny that it was the American that showed them the way in this matter.

We learn from our sprightly French contemporary, *Le Franklin*, that the great Café chantant "L'Eldorado," in the Boulevard de Strasbourg, is now for the first time lighted with electricity. The installation consists of thirty voltaic arc lamps, system Cance, and seventy incandescent lamps. The motive power is furnished by a steam engine of the Olry-Granddemange, having a nominal power of forty horses, and Collet boilers that are non-explosive. The dynamos were constructed by Ducommun, of Mulhouse, on the Gramme principle. Each will feed five of the Cance arc lamps. The arrangement of the lamps shows considerable ingenuity. There are twelve to sixteen arc lamps in the auditorium—four in the café in the boulevard, four before the front of the theatre, one in the entrance, and the others about the sides and behind the scenes.

The installation, though hurriedly, was thoroughly made, the gas during the hot nights making the place almost unbearable.

The Casino de Bougeval was also recently lighted with electric lamps. There are in this installation sixteen Jablochkoff candles. In the Jardin de Paris, in the Champs Elysées, there are twenty lamps of the same system recently put in. Both of these installations were made by the Société l' Eclairage Electrique, and in both the new chandelier of M. Bobenrieth is used.

This new chandelier permits of a reduction of cost of light down to the lowest possible point, and it is used by the société in all its illuminations, and notably in that in the Concours Agricole, at Nogent sur Seine, which comprehends six lamps of six millimeters, and sixteen lamps of four millimeters.

All these installations have been made with great care and ingenuity. There is the installation at the Theatre l'Ambigu, and that at the Palais Royal, and nowhere has there been a better distribution of light than that to be seen at both these places. At first the Swan incandescent lamps were used, but these did not give satisfaction, and they have been taken out, and the Bréguet Company, who have charge of this part of the business, have very recently substituted the Woodhouse & Rawson incandescent lamps.

Since last May the fast train between Liverpool and Manchester has been lighted with Woodhouse & Rawson incandescent lamps.

The lamps have been placed aboard the five yachts belonging to the successful chocolate manufacturers, the Messieurs Menier. These yachts, La Nubienne et la Giralda, each have fifty of these 10-candle incandescent lamps, and when anchored are a perfect blaze of light from stem to stern.

The Eden Theatre, in Paris, will, the coming season, be lighted with electricity.

These Woodh use & Rawson lamps of 10 candle-power demand an E.M.F. of only 100 volts, with an intensity of current of 0.25 ampere.

In Belgium the administration of the Post Office are making some experiments near the College of the City Council of Brussels, in order to obtain an authorization to construct upon the Place de Brouckere an annex for the reception of the apparatus and motors necessary for electrically lighting the neighborhood of the Temple des Augustino (Hotel des Postes). The situation in the postal bureaux becomes at times intolerable, the heat is so great, and, worse still, the gas renders the air unhealthy, it being impossible to maintain the same efficiency among the department clerks as obtains during the cool term. The College of the City Council of Brussels will, it is said, accord to the State the authorization asked for.

In Vienna, Austria, we know, says the *Bulletin International*, that the Gas Company has decided upon a central electric station, from which the electric light will be distributed to private houses and offices. This installation will comprehend 12,000 lamps (incandescent) of 16 candles. These will cost the consumers twice and a half as much as gas; at Paris this would be 75 centimes the cubic meter. This looks as though the Viennese were willing to pay very dearly for their electric light. The electric station will be composed of four steam engines of 200 horse-power, four dynamos and 9,600 accumulators. The price of each accumulator will be 60 florins (126 francs, or $25.20). These secondary batteries alone will necessitate an expenditure of 1,200,000 francs. This is, indeed, a tremendous outlay, and, if all the other things which appertain to the installation are treated in the same grandiose manner, it will not be surprising if the sum fixed for the electric light, already unusually high, must, of a necessity, be still further raised. It will be interesting to learn whether, with the imposition of such conditions, the company will find any patrons.

Interesting experiments were recently made at Shœneberg, near Berlin, according to the *Electrische Tecnik fur Studentenkunde*, upon the application of the electric light in the military reconnaissances effected by captive balloons. The aeronaut, furnished with a powerful arc light, is sent up to an elevation of 60 meters. The light projected by a reflector will, it is found, light up the country for miles around, and permit the observation and record of details of topography. The light was fed by a Siemens' dynamo, and telephonic communication was maintained.

NEW PRIMARY BATTERIES.

One of the most promising of all recent batteries is that of M. M. Lalande & Chaperon, of Paris. A full description of this cell appeared in this journal in the issue of the 28th of February, 1884, and a general examination is all that is now required.

The idea was to discover a combination where the zinc would not be attacked on open circuit where the depolarizing substance would be a solid body insoluble in water. The inventors finally adopted as fulfilling the first requirement a 30 to 60 per cent. solution of caustic potash. A large number of metallic oxides were tested and oxide of copper gave the best results.

By the transformation of the alkali into alkaline zincate the internal resistance undergoes almost no change. The zinc always remains surrounded by a solution of potash relatively pure because the zincate which forms falls to the bottom by reason of its superior gravity. Thus the zinc when it is employed as a horizontal plate can be used until it has become a leaf as thin as a sheet of paper. As to the by-products, Mr. J. Berger-Spruce estimates that the oxide of zinc returned by the cell will equal in value the pure zinc introduced.

The only defect which has so far been found with this cell has been a deposit of the hydrate of copper, which forms on the parchment paper, if it is used, between the two electrodes, and which augments the internal resistance a little. Another objection to the cell is the necessity for keeping it hermetically closed to prevent absorption of carbonic acid from the air. It is not absolutely true that the zinc is not attacked by the potash on open circuit. If a portion of the zinc is not covered by the liquid, it is strongly attacked at the level of the liquid by the potash, so that soon its inferior portion detaches itself from the upper and falls to the bottom. On the other hand, if it is completely submerged, an electro-chemical action is set up between the zinc and the pole wire. This has been corrected by using a brass plate, or screwing a pole wire of brass into the zinc and amalgamating both. The electromotive force is not very great; one authority makes it 0.94 volt and another 0.98 volt, but the internal resistance is small; it varies with the form and size of the cell, but is, on the average, from $\frac{1}{4}$ to $\frac{1}{5}$ an ohm for 1 decimeter (about 4 inches), square of electrode separated 5 centimeters (about 2 inches). M. Hospitallier has experimented with the small size, charged with 200 grammes ($\frac{1}{2}$ lb.) of oxide of copper, and 800 grammes (1$\frac{1}{2}$ lbs.) of a 40 per cent. solution of caustic potash. This element remained on closed circuit through a resistance of only 0.8 ohm for six days without losing, to any practical extent, its initial force. It furnished during this time 259,000 coulombs; that is, within 100 coulombs of the quantity determined by calculation, considering the zinc consumed. This shows that there could have been little chemical action in the cell but what was transformed into electricity. The three elements which constitute the cell are used in nearly the following proportions: Zinc, 4; caustic potash, 12; oxide of copper, 5. It is stated that if a small quantity of chloride of magnesium be added to the oxide of copper, the constancy will be increased.

As regards its application to electric lighting, it has been stated that 48 elements, of a decimetre square surface each, have maintained from 15 to 19 Woodhouse & Rawson lamps, of 10 candle-power, in series. Again, a correspondent of the *English Mechanic* gives an opinion, as the result of his experiments, that the electromotive force is 0.9 to 1.0 volt only at the first moments of the closing of the circuit, and that it soon falls to 0.6 volt, and remains there. He also states that he found it necessary to place a zinc plate of about 16 inches square at a distance of about 1$\frac{1}{2}$ inches from the oxide of copper, to obtain a current of one ampere without polarization. He found it necessary, also, to use 15 elements to feed a single lamp requiring 9 watts. Under these conditions, the battery would maintain the light for 150 to 200 hours. There is no doubt but that the working electromotive force of this cell is about 0.6 ohm.

The dry pile of M. Wolff has been compared very favorably to the others. The inventor makes the following claims for his cell: That it can be operated without an external jar; that it has the same electromotive force and resistance as the Leclanche; that it operates equally well in all positions, and will stand rough handling; also, that it can easily be regenerated by passing a current in the reverse direction through it; it is thus never necessary to replace the zinc. The zinc electrode forming the exterior base is a cylinder of 4$\frac{1}{2}$ inches in height and 3$\frac{1}{8}$ inches in diameter. The middle of the cylinder is occupied by the carbon electrode, which is separated from the zinc by the solid exciting material, the composition of which is held a secret. This opening is closed by a caoutchouc ring. There are two sizes of cells. The smaller element has an exterior resistance of 0.4 ohm, and an electromotive force of 1.2 volt. In circuit, with an external resistance of only 0.5 ohm, the initial force (1.30 volt) fell at the end of 30 minutes to 0.95 volt. A rest of 24 hours

brought it back to 1.2 volt. With one hundred ohms in external circuit, and an initial force of 1.17, it fell to 0.98 volt in 54 hours. The larger cell acts still better. Electromotive force = 1.3 volt; internal resistance = 0.3 ohm. During a closure of 24 hours through an external circuit of 100 ohms, the electromotive force of 1.32 volt fell to 1.28 volt.

In conclusion, we must still adhere to the old standard Leclanché Battery, which stands as yet in the lead.

The Newport Illuminating Com'y, Newport, R. I., have decided to increase their works. Their system of lighting has proved to be very popular, and the demand for lights is 'way ahead of the capacity of the station.

GENERAL WESTERN NEWS.

For fifty years Mr and Mrs Judge J. D. Caton, of Chicago, have pulled in duplex harness over the rugged hills and quiet vales of married life, and on the evening of the 28th instant celebrated the anniversary of their marriage. Judge Caton was one of the old-time telegraphers, he having been the head and front of the Caton lines, well known to the gray-headed operators who learned the art in the good old days, when to be an operator was to enjoy an eminent place in society, and possess the *entree* into the ranks of the *haut ton* and hold the magic presence which defied the door-keeper and ticket man, and compelled respect from the treasurer of every passing exhibition.

"Alas! how times have changed with us!
To be an operator now
Is to work Sundays without pay,
And ante up for every show.
No free cigars, no tips from friends,
The girls all scorn us as we pass;
Grim sorrow with our night work blends,
And all our hopes are withered grass."
—*Operator's Lament.*

"It never rains but it pours," is as old as trite, and finds a proper application in the case of our City Hall. No sooner had the Edison people commenced running their wires for lighting the various offices in the building, and the two tunnels, than the telephone people came upon the scene with appliances for connecting the various heads of departments throughout the building, so arranged that each may ring up another without the intervention of a central office—in short, an automatic exchange, independent of outside help or interference.

Last, but not least, considering the size of his electrical conductor, came the lightning rod man, who skimmed seventy-five feet of flag staff surmounting the building, and successfully placed a lightning arrester thence to the ground. Now, when the little dynamo is up, and doing the work of lathe turning and other light labor in the repair shop, our City Hall will be well supplied with electrical appliances.

The Electrical Supply Company, at 175 Lake street, claim that their merchandising enterprise has been very satisfactory, and despite some misgivings, successful beyond their expectations. They are carrying a general assortment of everything in the electrical line from a fine naked wire to the most delicate test instrument, and have recently become agents for the Eastern Electric Cable company's copper wire cables, for telephone and telegraph service. A central core of copper, surrounded by insulated copper conductors, a foil shield surrounding this, an outer covering of rubber, and an armor of braided linen steeped in a compound of a nature to render the whole weather-proof, and you have the new cable.

An electrician residing near Humboldt Park, while coming to the office during a severe thunder storm on Wednesday morning last, felt a curious prickling sensation on one side of his body, and before he was hardly aware of the pain he saw lightning strike a wooden structure near the side of the track over which he was riding. The house was an unpainted one hardly finished, and the lightning left a zig-zag mark down the front of the building. A huge cloud of what seemed smoke and steam rose from the spot, but the fire, if there was any, was quenched by some one at hand, as the building did not burn while the street car was within seeing distance. He says that is the heaviest induc ion he has known in all his telegraph experience, and he is satisfied with one sensation of that kind.

The funnel shaped cloud epidemic has struck Vincennes, Indiana. On the 25th instant, about four o'clock in the afternoon, one of these uncomfortable gyrators approached the city, and assuming the role of a waterspout, swept down to the Wabash river, where it upset all the small water craft in its reach; whirling water into the upper air, making a grand, awful, but harmless exhibit of its power. The cloud was estimated by eye-witnesses to be about 200 feet in circumference.

For nearly three weeks hardly a day has passed without an account of some such evidence of lightning play, while the number of buildings struck, lines lost, and other damage done by these electrical disturbances seems far in advance of the average. There appears also to be a wider range than usual for these displays, and it is to be hoped that from facts recorded a theory may be formulated, and if possible, some method of either preventive or cure evolved.

Apropos of the following incident related by foreign correspondents, it may be mentioned that the sycamore is a very good natural lightning rod. A gentleman, who formerly resided in western New York, says that it was proverbially believed that a sycamore over a house or a barn would protect it, and the same statement has before been made to your correspondent.

In the city of Amiens the Hotel du Rhin has a natural lightning rod in the form of a sycamore tree. This tree stands in the garden of the hotel, and was struck for the third time on the 28th of May last. From the fact that the tree seems to discharge these heavy potentials without serious damage, it is inferred that its roots are in communication with a permanent body of water beneath the surface.

A table showing the increase of lightning strokes in the kingdom of Saxony, from 1859 to 1882, would seem to indicate that some steadily growing cause which should be sought out and remedied, is rendering thunder storms more frequent, or at least more dangerous than formerly.

The periods given in each case are three consecutive years. From 1859 to 1862, the number of strokes was an average of 67 per year. The average increase for the next period was 81, or 1.2%. Following these by three-year periods, the annual averages are 104, 123, 145, 189, or an increase of 1.6, 1.8, 2 2, 2.8. These figures are from statistics collated by the statistical bureau of Dresden.

In the directions for installing and caring for secondary battery circuits by F. G. Howard, published in the last number of the REVIEW, the daily testing of electric light circuits to keep them clear of grounds, is a very valuable and timely hint. The disfavor which is so often apparent when it is proposed to erect an electrical conductor for illuminating purposes, has its birth in the too often careless installation of these plants, and the unmechanical methods which prevail in placing machines, wires and lamps. In a large proportion of plants, accurate tests show from one to three or more leaks, and this from the first day of service. It it a broad assertion, but it is capable of demonstration.

While in localities where competent inspection is required by authority of law, these faults are pointed out and remedied; but where lines are put up regardless of legal restriction, and too often by incompetent parties, the public has no means of knowing whether the various parts of the plant are properly placed and thoroughly insulated. And again, even when installed in the most perfect manner at the commencement, subsequent changes in the vicinity by metal workers, may, at any time, through ignorance or carelessness, or even willful intent, introduce elements of danger without any probability of discovery, until more or less mischief has been done. Especially is this the case in central plant circuits, where a sign, an awning frame, a stay wire to a metal flue, a metal frame, post or lintel, may be brought in contact with the circuit, and thus introduce a heavy, if not a dead ground, with the first rain. An example or two may make this clear. These are only specimens at random from many which could be mentioned, and are veritable.

In a small town north of Chicago a central plant is installed, which traverses the principal mercantile establishments of the place. The wires are strung heedlessly along the fronts of the buildings, with one or two lights in nearly every establishment. Iron fronts in this block, during every wet day, are carefully avoided by the citizens, as they pass in and out, for the shocking capacity of these has been abundantly proven on several occasions. The leaks are not yet sufficient to produce material injury to persons or property, but, reasoning from analogy, the day is not far distant when they will have so increased that either the plant will have become much deteriorated—worthless, perhaps—or a serious accident will occur to remind somebody of the power for harm which is innate in a dynamo current.

In another locality, not far from Chicago, a store lighted by electricity was, as the citizens termed it, so loaded with current "that the proprietor, every wet day, placed a plank on the iron door sill, that persons coming to the store might not be shocked by the escaping current. As in the former case, the sensation was not severe, but unpleasant. The sill was comparatively insulated, being separated from the sidewalk by wood, but was in metallic connection with the columns, and through them to the awning frame and the lamp wires, and, with one foot upon the wet walk and the other upon the sill, sufficient ground connection was established to set up a derived circuit by the aid of some other ground in the line.

Now, there is a remedy for all this, and that remedy is the testing of the circuit—a matter of but a few minutes every day. A simple form of galvanometer—a half-dozen cells of battery, properly handled—and the most obtuse engineer could be taught their use in a short time—would do the work. Or, with a magneto, if the current be sent through the body of the operator—if the magneto will not ring when connected direct. By holding one of the binding posts with the hand, while holding the magneto terminal with the other, a more delicate test is made. Wetting the hands renders the test still more delicate. Finer and higher tests may be made by using the wrist in place of the hand, then wetting this, and so on up to the placing of one, and finally both wires upon the tongue. In this way a little practice will soon educate the sense of feeling up to a point where a variation in the insulation of a line will be quite readily appreciated.

It will be understood that by commencing with the lowest test, as above, and working upward through more sensitive portions of the body, the unpleasant results of a severe shock are avoided. For, if there should be a dead ground upon the line, the alternate currents generated by a magneto bell apparatus, if sent through the tongue, would be extremely uncomfortable, to say the least of it, while, by proceeding as above, at no point would there be any serious effect produced.

Testing, as ordinarily practiced, is of no sort of use, unless the ground contact is sufficiently good to reduce the insulation to at least ten to fifteen thousand ohms. Beyond that, save in exceptional cases, the magneto gives no intimation of a ground leak, and the insulation of a light plant is not safe until it has far exceeded that measurement.

The "Chicago Commercial and Financial News Company," an organization something similar to the Gold & Stock Company, are obtaining subscriptions and making other necessary arrangements looking to the opening up of their enterprise on the 1st of September. The new ticker which they will use requires but a single wire, and by the use of a key on the transmitter the change from figures to letters, and the reverse, requires no stoppage of the rotating type wheel. Through this and some other peculiarities of construction, it is claimed the new ticker has a speed something like three times that of the "ancient and honorable brass mounted" instrument heretofore used.

The company owns a duplex wire connecting with the New York Stock Exchange, and will receive its quotations the same as other telegraph companies. The managers state that the subscription list is rapidly filling up with most satisfactory patrons, and that indications are fair that the Lumberman's Exchange alone will be represented by no less than 200 of these new instruments.

Mr. Bruce, who, with County Commissioner Van Pelt, is directing the affairs of the company, has had assurances from the market quotations committee of our Board of Trade that the new company could have the Board quotations on the same terms and footing as any of the telegraph companies.

Pittsburgh papers report that quite a harvest has lately been reaped by a swindler hailing from Chicago, who contracts in the name of the International Manufacturing Company, for lightning rods and weather vanes. Between $5,000 and $8,000 have been scooped in in the form of advances on contracts of this nature, and the dashing young *chevalier d'industrie* has vamoosed from the scenes of his late labors in the rural districts of Pennsylvania.

Col. S. G. Lynch, 144 La Salle street, quotes telephone stocks at the close of July, as follows: Central Union, 59@60; Chigago, $3 75; Great Southern, 50@55; Iowa Union, 23@25; Michigan, 68.70; Missouri & Kansas, 56@58; Rocky Mountain Bell, 50@55; United 15@17.

Chicago, August 6th, 1885.

RICHMOND'S ELECTRIC LIGHT CONTRACT.

RICHMOND, Va., July 28, 1885.

H. M. Linnell, Esq.,
Business Manager Schuyler Electric Light Co., Hartford, Conn.

"Schuyler Company has the contract. Accept my best wishes."

W. R. BOWIE,
Chairman Electric Light Co.

The above telegram assures to the Schuyler Company another large contract, and carries with it concessions almost without precedent in this country. The contract is for five years, and provides for lighting the city in such a manner as will make it one of the most brilliantly lighted cities in the United States.

In addition to the contract for the street lights, the city has granted the Schuyler Company the sole and exclusive right to furnish electric light and power of all descriptions to private consumers for and during the period of five years.

This company is composed of some of the most prominent and wealthy of Richmond's capitalists, and in conjunction with their local company have commenced negotiations for the control of some of the Southern States, intending to form a construction company under the Schuyler patents to operate the same.

The plant itself will consist, first, of 200 arc and 1,000 incandescent lights to supply the order from the city and the subscribers for private lights already obtained by the local company. These will be at an early date increased to meet the demand which invariably follows the introduction of an electric light in any city.

Richmond has heretofore been almost the only city of its size that has not had the electric light. The securing of this contract was attended with difficulties which are not usually met with in securing electric light contracts, inasmuch as the city owned its own gas works, and consequently could obtain gas at its cost for its own use.

Telephonic News

*** The multiple switchboard system is being introduced in Stockholm, Sweden.

*** Two and a half miles of sixty-foot poles are being put up at Cleveland, Ohio, by the telephone people. There are about 12,000 telephone connections made daily in this city.

*** Messrs. Cedergren and Ericcson, of the General Telephone Company, of Sweden, in opposition to the International Bell Telephone Company, are in the United States inspecting telephone systems.

*** These are the days when numerous more or less excited individuals see balls of fire the size of watermelons running along telephone and telegraph wires and exploding with a loud noise and sulphuric smell.

*** The Sioux Falls telephone system has been rebuilt within 14 months. The city had some difficulty at one time and made things lively with the wires, denying the rights of the company; but the case was decided against the city, and now the question is how much damage was done.

*** The official July Directory of the Bell Telephone Company, of Philadelphia, has reached this office. There are 3,000 names in the list, and not a single advertisement. The company permit all their subscribers to connect with the forty-two exchanges of the Delaware and Atlantic Telegraph and Telephone Company, all of which are within easy telephonic distance of Philadelphia.

*** The American Bell Telephone Company's record of instruments shows that for the month ended July 20, 2047 telephones were sent out and 2361 returned, a net loss of 314, against a net gain of 2278 for the same month last year. The number of instruments now in use in the United States is 334,786. General Manager Vail and Assistant Manager Madden retired July 29, their successors, Messrs. Hudson and French, taking office the following day.

*** The American Bell Telephone Company and Chesapeake and Potomac Telephone Company, through their attorney, Hon. Charles J. M. Gwinn, filed bills for injunction in the United States Circuit Court, at Baltimore, against F. W. Trimble and John W. Trimble, doing business as F. W. Trimble & Co., J. H. Thiemeyer & Co., and Becker Bros. & Son, all of Baltimore, to restrain them from using certain patents on telephones, of which complainants claim to be the sole owners. These cases will be determined by the ones which have been already filed.

*** A telephone company may be held liable for an injury to a passer-by by the fall of its wires in a public street caused by the weight of ice produced by water thrown upon them by a city fire department while extinguishing a fire, according to a decision of the Supreme Court of Minnesota in the case of Nichols vs. City of Minneapolis, decided on the 9th ult. Where such a company is given a license to string its wires over a public street, it is, in the opinion of the court, burdened with the duty of maintaining those wires in a safe condition, so that they may not become nuisances or endanger the safety of the traveling public.

*** On Saturday, the 27th June, the Telephone Company of Egypt, by permission of the Eastern Telegraph Company, had a trial of long-distance speaking instruments between Cairo and Alexandria, a distance of 135 miles. The result was, in the words of the manager, Mr. Evans, "Very satisfactory, far surpassing any previous trials; the magneto bell rang well between the two places, and the speaking was clear and distinct." The instruments used were a pair of the Consolidated Telephone Construction and Maintenance Company's long distance speaking transmitters, with magneto combination and bell receiver, sent out by that company specially for trial in Egypt.

*** There are 700 telephone subscribers in the city of St. Paul, Minn., and about 4,600 connections made daily.

*** More than $100,000,000 is invested in telephones in the United States, and yet some people say talk is cheap —*Oil City Derrick.*

*** It is not yet understood just what conclusion the representatives of the Cumberland Telephone Company and the Citizens' Committee, of Evansville, Ind., will come to. For several days past the bodies have been in conference, with the object of reaching an amicable settlement. The committee were anxious to make a compromise and sign a contract similar to the one now existing in Indianapolis. The contract in that city is to the effect that the rental shall go on as at present, and until the Supreme Court can reach a decision on the legality of the law. If constitutional, the company is to refund the excessive charges. This was the main point under discussion between the telephone representatives and the citizens' committee. The representatives had the matter under consideration for a day or so, and finally wrote to the committee stating that they would take no action upon it whatever, but let things sail along as they have been doing.

*** M. Sarrien, Minister of Posts and Telegraphs, has recently granted a new concession for a telephonic *reseau* in Paris to M. Dauderni, who proposes to establish lines on the Adbank Abakanowitz system modified by Dr. Herz, a detailed description of which has been published in *La Lumiere Electrique.* It is a magnetic system without batteries. At the same time the Municipal Council of Paris, after a number of delays, has adjudicated on the question that had arisen with the Societe Generale des Telephones, on the laying of conductors in the sewers. Permission has been accorded to the company to continue the use of the sewers for a period of four years. At the same time, the Municipal Council has passed certain rules apparently outside its scope, and which doubtless will be actively resented. Among these rules, one refers to certain regulations to be imposed on the employes of the company of both sexes, and another seeks to impose on the Societe Generale and on other undertakings to which concessions will be granted, rules referring to reciprocal transmission. This last rule has a special bearing on the concession recently accorded by M. Sarrien. A few days will show how the Societe Generale des Telephones has received the new regulations of the Municipal Council.

*** The following from the Dallas *Herald* would indicate the existence of considerable vitality in the Pan-Electric Company in Texas." "A *Herald* reporter called in at the exchange of the Pan-Electric Telephone, which is located in the second story of the building on the southwest corner of Elm and Stone streets. Extensive preparations are being made, and when completed it will be the finest exchange in the South. The switch board of the latest make and improved is of cherry wood, with nickel-plated drops and numbers, and registers over 300 numbers. It is more rapid and thorough than any switch board in use, and cost a goodly sum. It made the reporter feel like a pauper when he heard the sum it cost named. Lightning arresters are being placed in position to prevent the burning of wires. The wire used is the hard-drawn copper wire which is used on all the company's lines, it being a superior conductor of the current. A large force is at work stringing the wire for the line, and a force is also engaged in putting in house and business connections for the 'phones. The territorial line between this city and the town of Fort Worth will be completed within a week, and every effort will be made to have the exchange in ship shape on or about the 1st of the month. Mr. J. G. Watkins, State electrician and superintendent for the State, is here looking after matters. He says they are putting up an exchange in Denison, and that the placing of poles will begin to-day. There is a large lot of wire here on hand. There is one thing about the Pan-Electric, it does not propose to encumber the streets with a number of wires, but will confine them, as near as possible, in cables."

The Telephone.

DIFFICULTIES WHICH SURROUND LONG-DISTANCE COMMUNICATION.

(Cor. Cincinnati Commercial Gazette.)

Granting that a long distance telephone will be forthcoming, it will require an absolutely perfect condition of the elements along the route over which the wire runs; there must be no rain, no fog, no sleet, nor mist; no moisture in the atmosphere, no electrical storms, and, besides, there must be invented a more perfect system of insulation of the wires where they come in contact with the poles than is used or known at the present time. A means must also be devised to entirely overcome induction (the influence exerted by the current on one wire over another, running parallel with and in close proximity), or, in other words, overcome itself, for wherever you have a current you have also induction, or an induced current.

After all these difficulties have been overcome there still remain many reasons why it will not be a success.

If an inferior means of communication attempt to supplant a superior one, what must be the result?

For long distances the telegraph is as much superior to the telephone as the "limited" express trains are superior to a canal boat—not for a single isolated case, but for the volume of business that is daily sent over the telegraph wires.

A telephone wire between Cincinnati and New York would be capable of accommodating not to exceed six customers per hour, allowing ten minutes to each, including the time necessary for calling the exchange here and for the exchange to call New York, and for that exchange to ring up the party with whom the Cincinnati customer desires communication.

At this rate—a very liberal allowance—only six communications per hour would be possible, or seventy odd for every twelve hours. The great bulk of communications between these cities is of a commercial nature, and generally of much importance, nearly all of them requiring transmission between the hours of 8 A. M, and 5 P. M. (nine hours). This would necessitate one wire for every six persons using the telephone per hour during that time. For the accommodation of the Cincinnati customers alone, there would have to be no less than ten direct wires, and then the anxious customers would have to almost constantly face the usual cry of "Wire in use; call again."

Now, taking into consideration all the cities west and south of this place which would look to Cincinnati for their eastern communications, the number of wires would reach well up into the hundreds. At Pittsburgh (over the middle route), at Cleveland (over the northern route), the number would be more than doubled; and this, too, for wires actually needed to supply the western demand for connection with New York City; not taking into consideration the great demand that would arise for wires to all other important eastern cities, such, for instance, as Boston, Philadelphia, Washington, Baltimore, etc. It would require the duplication of the present number of telegraph wires throughout the United States and Canada ten times over.

No, sir; the telephone will never become a competitor of the telegraph, for the transmission of the telegraph is quicker, more reliable, less troublesome to the customer, and, besides, it is, or should be, responsible for all errors.

The coming long-distance telephone will be a plaything, nothing more. Put a mark on the assertion.

*** Manager Fair, of Lincoln, Neb., reports his telephone affairs more disarranged by last Tuesday's storm than at any other time this season. For an hour and a half, Tuesday evening, they were not able to use the wires at all, and many of the lines were demoralized to such an extent that it took all the next day to repair them in the city, while at three o'clock he was still unable to use the Crete line, although a man had been sent out over the line early in the morning.

Underground Conductors.

CONDUCTION AND INDUCTION.

It would seem that the numerous inventors of anti-induction cables (so-called) have ignored the results of Faraday's researches, which enabled him to fix the true theory and laws of induction. By his judicious experiments he demonstrated the fact that induction is the result of an action of contiguous particles, which action is set up by the electrified body, and consists in a species of polarity, the particles assuming positive and negative parts, which are arranged symmetrically with respect to each other, and the inductive surfaces as producing the effect. We know that all substances are more or less conductive of electricity, and therefore it is but fair to suppose that those known as dielectrics follow the same laws as the more perfect conductors, and that the action on the particles of conduction differ only in degree from the action upon the particles of a dielectric, and that the particles of a conductor become polarized in the same way as those of a dielectric, but with greater ease and rapidity, thus constituting what is termed "conduction." By conduction, each molecule of matter, forming what is termed the circuit, becomes polarized, and by that means produces a current in the circuit. In a copper wire wound with an insulating material, the molecules in the wire, starting from the battery, would first polarize in succession; next the molecules of the insulating material; then the molecules of the earth in which the cable is buried. If Faraday's hypothesis be correct, it may be said with apparent justice that "conduction" as well as "induction" is the effect of polarization, and, therefore, the higher the resistance of a substance, the lower should be its inductive capacity. This deduction is not sustained by experience, for there are substances which give very high resistance and comparatively high inductive capacity, and others which give a comparatively low resistance and at the same time a comparatively low inductive capacity. This anomaly is explained by the the fact that conduction differs materially in effect of polarization, according to time. One dielectric may test higher than another at the end of the first minute of polarization, and lower at the tenth minute. It is therefore clearly incorrect to assert that one dielectric has a higher resistance than another; all that can be absolutely stated is that the resistance is higher or lower after a definite time of polarization.

When two long conductors are placed parallel to each other, each forming a separate and complete circuit, and a current of electricity is sent into one of these conductors, an electrical effect is produced in the other conductor by "conduction" and "induction"—the two causes uniting to produce a current in the other conductor. The force exercised by "conduction" will bear a relation to the conductivity of the substance representing the conductor, and the force exercised by "induction" will bear a relation to the distance separating the two conductors. There are dielectrics which reduce to an inappreciable quantity the effects of "conduction," but there is no dielectric which can lessen the effects of "induction," which acts with equal effect through any dielectric—even dry air—at equal distances.

It seems conclusive that when several conductors are placed in close proximity side by side, although separated from each other by dry air or any other dielectric, the effects of induction are not affected.

The question then arises (and a vital question it is, considering the action of many of the municipal authorities), Can the telegraph and telephone companies place their wires underground in such a manner as to be able to operate their instruments to the satisfaction of the public? W. C. BARNEY

WASHINGTON, July 31, 1885.

*** During the thunderstorms of the 14th inst., the electrical disturbance of the atmosphere in Berlin had such an effect upon the telephone system that it was considered necessary to consult the safety of the officials by suspending the service until the storms were over.

Sale of Bankers and Merchants' Telegraph Company.

The sale of the Bankers and Merchants' Telegraph Company's lines to satisfy the claims of the Farmers' Loan and Trust Company, took place at noon, Saturday, at the Real Estate Exchange. When Auctioneer Peter F. Meyer ascended his platform to read the schedules containing a description of the property, effects and assets to be offered for sale, the Exchange was filled with business men and lawyers. The schedules from A to E, inclusive, occupied fourteen pages of printed matter. It took the auctioneer half an hour to read it. He was hoarse when he finished.

Edward Harlan, receiver of the American Rapid Telegraph Company, then read a notice warning the auctioneer that the Rapid Company claimed a larger part of the plant of the B. and M. Company, and also that they had a lien on the lines.

Charles A. Judson attorney for the Great Eastern and International Telegraph Company, read a notice protesting against a promissory note mentioned in the schedule, saying that it was fraudulent. One or two more protests were read, claiming that certain portions of the property in the schedule did not belong to the B. and M. Company.

Having satisfied himself that there were no other like announcements to be made, the auctioneer opened the bidding after giving notice that 10 per cent. of the purchase money would be required immediately after the sale, and the remainder by noon on August 10th, next.

Edward S. Stokes, who was surrounded by other bondholders of the company, opened the bidding promptly by offering $250,000.

"Hear that, gentlemen?" chimed in the auctioneer. "The property is worth ten times that, it cost ten times that amount to put up the lines."

A small thin voice in the crowd yelled "$400,000!"

"Ah! that is the way - it's booming. Who will raise it? gimme another bid?"

H. H. Eldred rushed through the crowd and in a deep bass voice cried: "I'll give you $800,000 cash on the spot for the line if you will give me a clean title?"

The auctioneer paused. Col. Ingersoll, who stood near Stokes, took off his hat and stared at the bidder.

"Go on," shouted a voice in the crowd, "that is all gammon."

"No, I'll give it. I have the cash, but I want a clean title."

The autioneer smiled and said: "Will sell you the schedule as I have read it, nothing more; nothing more. $400,000, who will offer any more? Make it half a million?"

Ed. Stokes pulled his arms from over the railing and said in a low voice:

"$500,000."

"Half a million! $500,000!" shouted the auctioneer. "Now is your time. Remember that I gave you fair warning."

The crowd moved up nearer.

"Once, twice, going, going, three times, for $500,000—gone to Edward S. Stokes."

It was announced by the auctioneer that the purchase was made in behalf of the Reorganization Committee, but Mr. Stokes interrupted him with:

"I buy it personally, just now. It may go to the Reorganization Committee later."

He went to the office of Turner, Lee & McClure, counsel for the Farmers' Loan and Trust Company, the plaintiffs, and gave his check for the necessary sum on deposit—$50,000.

The property sold, as set forth in the schedules, includes all the corporate rights, privileges and franchises of the Bankers and Merchants' Company of the State of New Jersey, Pennsylvania and Baltimore City, and all its property of every description. This embraces

5,463 shares capital stock Washington Improvement Co.
15,098 shares capital stock American Rapid Telegraph Co.
26,607 shares capital stock Southern Telegraph Co.
1,501 shares capital stock Pacific Mutual Telegraph Co.
3,010 shares capital stock Cleveland District Telegraph Co.
3,812 shares capital stock Lehigh Telegraph Co.
395 shares capital stock Board of Trade Telegraph Co.
550 shares capital stock Charleston and Morris Island Cable Co.
5,396 shares capital stock B. & M. District Telegraph Co., of Baltimore City.
200 shares capital stock B. & M. Telegraph Co., of New Jersey.
1,000 shares capital stock B. & M. Telegraph Co., of Pennsylvania.
200 shares capital stock B. & M. Telegraph Co., of Baltimore City.
200 shares capital stock B & M. Telegraph Co., of Massachusetts.
200 shares capital stock B. & M. Telegraph Co., of Connecticut.
200 shares capital stock B. & M. Telegraph Co., of Ohio.
200 shares capital stock B. & M. Telegraph Co., of Indiana.
200 shares capital stock B. & M. Telegraph Co., of Illinois.
200 shares capital stock B. & M. Telegraph Co., of Michigan.
200 shares capital stock B. & M. Telegraph Co., of Tennessee.

The following securities claimed to belong to the company now in possession of Receiver John G. Farnsworth:

One hundred and fourteen bonds of the American Rapid Telegraph Company, each of par value of $1,000.

A certificate for 200 shares of capital stock of U. S. Telephone Manufacturing Company.

Certificates for seven shares of American Rapid Telegraph Company.

Certificates for eight shares of Lehigh Telegraph Company.

Certificates for 4,700 shares of Commercial Telegraph Company.

Note of the American Rapid Telegraph Company, due February 1st, 1884, for $25,000.

Six other notes of the same company, due September 5th, 1884, aggregating $220,000.

Note of the Southern Telegraph Company, due January 1st, for $65,000.

Promissory note made by O. W. Randall, Treasurer, to the order of the International, etc., Company, for $25,000, dated March 29, 1884.

And all of the wires, poles, instruments, cables, and other appliances wherever located, together with leases, claims, and demands of every kind held by the Bankers and Merchants' Company.

The La Rue Telegraph Key.

This telegraph key, illustrated in this edition, was invented by Geo. W. La Rue, of New York, and is different from the Morse key, in substituting for the trunnions, or pivots, upon which the lever vibrates, a torsional spring or strip of metal, preferably spring steel, made flat and thin, to allow of a free torsional movements. This strip of metal is secured to the lever by two rivets, and is kept firmly in its place on the side posts by thumb-screws passing through the holes, having a shoulder fitted perfectly into the holes of the strip. By this arrangement the lever and spring may be quickly and easily removed for cleaning the contact points, or other purposes. The spring strip is stamped with a rib on one edge, similar to an envelope flap, which, with a small metal washer on the under side of the spring, prevents any vertical movement. The adjusting contact thumb-screws serve the double purpose of regulating the amplitude of the lever movement and of regulating the retractile resistance of the torsional spring. By this arrangement the ordinary spiral spring, to resist the downward movement of the contact-lever, is done away with. In the keys in general use, a retractile spring is always supplied to regulate the force required to depress the lever, as well as pivots and trunnions on which the lever vibrates. In the La Rue key the torsional spring not only takes the place of the trunnions, but, when used in connection with the adjusting screws, takes the place of the tractrile spring. The construction of the key is thus simplified by discarding two of the hitherto essential features, viz: the trunnions and retractile spring. The key can be used as a self-closing key, so often longed for on railroad lines.

La Rue Telegraph Key.

These keys have been subjected to the most severe tests by the Western Union, Baltimore & Ohio, and Postal Telegraph Companies, and all the managers and operators speak of them in terms of highest praise.

Messrs. Lytle & Co., No. 15 Cortlandt st., New York City, control the patents, manufacture and sale of this key. They will take pleasure in giving any further information, and have a descriptive pamphlet which they will mail free upon application.

.... The total annual value of the wire production and handling in Worcester is not far from eight and a half million dollars. It has within the past two seasons come to include copper wire with the longer known varieties of iron and steel.

.... While repairing some wires on a telegraph pole, near Glastonbury, Conn., Arthur W. Fisher, a lineman of the Connecticut River Telegraph Company, met with a serious accident. He was at the very top of the pole joining some wire, the only hold he had being the spurs on his boots. The pole broke near the base and dropped over, throwing Fisher a distance of almost twenty-five feet to the ground. He struck violently on his head and shoulders and rolled down the bank to the road below. Other linemen of the party hastened to his assistance and found him lying apparently lifeless. Fisher regained consciousness after a time and a physician was obtained from Glastonbury and made an examination of his injuries. He was badly bruised on the head and shoulders and suffered acute pain. In the physician's opinion he was not fatally injured.

.... E. W. Moon, of Sydney, Australia, who has been in this country for two months inspecting fire departments and electrical fire appliances and apparatus for the Government of New South Wales, has completed his task, and will start home on Wednesday by the way of San Francisco. He said to a reporter recently: "I paid a flying visit to Boston last week, and also to New Haven. I have looked over fire departments, fire brigades, electrical apparatus and appliances, until I am sick and tired of the word fire. New York has the best organized and equipped fire service in the country. The alarm system is, from the standpoint of a practical observer, not an electrician, perfect. I saw the quickest work here in actual service in turning out to a fire of all the places I have visited. San Francisco and Chicago come next to New York. The service in both those cities is excellent."

.... The Southern Home Electric Protective Company, which has been organized for the purpose of doing a general telegraph and electric protective business, filed its certificate of incorporation at Savannah, Ga. It has a capital stock of $500,000, divided into 500 shares of $100 each, with the power to increase it to $1,000,000. The company is to have an executive office at 518 Broadway, New York, and is to own, construct and maintain lines of telegraph in Southern States. It will have offices in Savannah, Augusta, Atlanta and New Orleans, and will make such connections with the executive office in this city as may be necessary for the transaction of the business, for the purpose of protecting buildings, together with their contents, against burglary and fire, and for doing a general telegraph business. The corporators, each of whom hold five shares, are Edwin Holmes, Henry C. Boome, B. F Dilion, Chas. A. Tucker and J. Merribew.

TELEGRAPHIC

.... The mirth and fun were at their height,
The pleasure without alloy,
When the merry company called that night,
For a song from the messenger boy.
And he blithely sang the good old song
That in youth we used to know,
Sang in a voice both clear and strong,
"Go slow, young man, go slow!"

.... The "Strong Current Protector," of the Western Electric Company, is appreciated by telephone superintendents who are ordering them quite extensively.

.... Lilian Roberts, the Leeds school girl who was arrested on a charge of forging a telegram from the Chief Constable of Leeds authorizing the release of a man arrested in Austria, has been discharged from custody. The girl's mother, who knew the man, wrote out the telegram, which was acted upon by the Austrian police, and their prisoner has not yet been recaptured.

.... A new visual telegraph is now said to be in operation between Guadeloupe and La Martinique, by means of an intermediate station at Marie-Galante. The speed of transmission is about a minute and a half per word, and two operators are required at each instrument. A French contemporary naively remarks that the cost of the installation of the apparatus is less than that of a telegraphic cable.

.... The Western Union Telegraph Company, on the 30th, paid $100,000 of the $250,000 back taxes on capital stock for the years 1882, '83 and '84, to the Comptroller at Albany, according to its stipulation with the State not to carry the question of the legality of the taxes to the United States Supreme Court if the corporation tax law was amended, so as to impose taxes only on corporate capital actually employed in the State.

.... In January last the Bankers and Merchants' receivers made up the following statement of poles and wire mileage. Present claims differ somewhat:

	Amer. Rapid Miles.		*B. & M. Miles.*	
	Poles.	Wire.	Poles.	Wire.
Massachusetts	215	668	....	845
Connecticut.....	223	722	78	2,452
Rhode Island	49½	110	....	406
New York	406	4,541	194	2,829
New Jersey.....	97½	682½	101½	2,090½
Pennsylvania	681½	3,354	107¼	4,086
District Columbia.	14	28	7	56
Maryland.....	177	546	78	848
Totals	2,163½	10,651½	565¾	13,612½

.... At a meeting of the directors of the Western Union Telegraph Company, the following was unanimously adopted: It having pleased Almighty God to call from the pains of this life the patriot, soldier and statesman, Gen. Ulysses S. Grant, late President of the United States, the directors of the Western Union Telegraph Company, by their Executive Committee, place this minute on their official record, as evidence of their appreciation of the great life thus closed. In a critical emergency in the history of our country, he arose from the position of a private citizen to lead the greatest army of modern times to complete success. To his genius and valor we are indebted for a restored Union. In war he was invincible, in peace magnanimous; in the hearts of his countrymen his memory will be embalmed to the latest generation. As tokens of respect to his memory, the General Manager will suitably drape the official buildings of this company until the final obsequies, and the directors will attend the funeral ceremonies, accompanied by the general officers of the company. As a further evidence of respect to the memory of the illustrious dead, the sum of $5,000 is hereby appropriated as a contribution to the erection of the contemplated National Monument in the city of New York, and the General Manager will also provide for the receipt and transmission of contributions from the public to the Grant Monument Fund at all he offices of this company.

ELECTRICAL AND SCIENTIFIC

* * The French railroad companies are about to adopt an electric gate opener, which not only attends the gates with fidelity, but vigorously rings a bell on the approach of a train.

* * The German-American Optical Company, of Frankfort, Germany, are erecting extensive works, and will use American skilled men as foremen, and the most improved American machinery in their works. They have purchased an American engine—the Ball Automatic—to supply their power.

* * Sunday, July 19, while there was not a cloud to be seen in the sky, a bolt of lightning descended into a pasture near the village of Seymour, Champaign Co., tore up the sod, kicked up the dust, and badly astonished the natives who witnessed it. The hole still remains, and if the story is doubted there is the hole to "show for itself."—*Monticello (Ill.) Bulletin.*

* * The residents of Laibach, in Germany, were astonished the other day by a shower of bloody rain. It subsequently was ascertained that a wind-storm just before the rain had caught up a large mass of red dye stuff at a factory in the neighboring village of Kaltenbrunn, and the dye, mingling with the rain, transformed the drops of water into apparent drops of blood.

* * The new electric clock by which the movement of the time ball at the G. R. & I. offices, Grand Rapids, is governed, has been placed in position in the telegraph offices of the company. The clock is after the style of the old fashioned box clock. It is supposed not to vary a tenth of a second during the twenty-four hours. It governs the time of all the clocks in the building, and also those in the Union depot.

* * Dispatches from Tashkend, in Asiatic Russia, state that a great earthquake has visited that region. It damaged most of the houses in the town of Bisherzed and ruined the cities of Suluk and Belovodsk. In the latter place a church was shaken to fragments while it was crowded with worshipers, a large number of whom were killed. The earth opened in great fissures in Belovodsk and many people were swallowed up.

* * The Russian admiralty have under consideration a proposal to construct an electric boat. Its length is to be about 100 feet and its width twenty feet. The electrical power is to be stored in fifty accumulators, which, it is calculated, will suffice for four hours. Its mean speed will be nine knots. In the fore part a lighting apparatus of 6,000 candle-power is to be placed. It is especially intended for action against hostile torpedoes.

* * Mr. Percival D. Richards, formerly treasurer of the Merchants' Electric and Power Company, has recently invented a very simple piece of mechanism, whereby, through certain applications of electricity, it is claimed that the deviation of a ship from her regular course is instantly and automatically made known by means of an alarm; and, if necessary, the amount of such variation is recorded. A number of prominent Boston gentlemen are interested in it.

* * Norwegium is the name given to another new metal, which is now added to our rapidly growing list of elements. It was discovered by Dr. T. Dahll in examining a specimen of nickel ore from Kragero, in Norway. It is a malleable metal, of white color, with a tinge of brown; it presents, when pure, a metallic luster, but on exposure to the atmosphere becomes coated with a thin film of oxide; its hardness is about that of copper, and its specific gravity is 94441. At 350° C. it melts! From its physical properties and chemical reaction it appears to differ from every other known metal, and Dr. Dahll claims for it a distinct individuality.

Electric Lighting and the Gas Engine.

In an interview, a Boston electrician publishes some interesting facts concerning electric lighting. He says:

"Electricity has had to fight its way against enormous gas interests everywhere, as well as against the prejudices of the more conservative who are generally among the most influential men of every community 'If this new light is a success, gas is doomed!' was the general cry or feeling among those interested in the gas supply, and even many of those engaged in electric lighting thought that this would be the case. But later experiences have either materially modified or radically changed this view. The general adoption of the electric light in place of gas, so far from curtailing the consumption of gas, would have the tendency of increasing its use very materially for heating and cooking purposes, and even for the production of steam. This, of course, you will understand, could be done at lower prices by the gas companies, because, not having to carburet the gas, it could be made very much cheaper than if made for illumination. This is true.

"But there is still another use for gas which was not then anticipated, and which can now be utilized for isolated or house plants, and that is its use in a gas engine to produce power, which power can be transmuted into electricity. I presume some of your readers would smile incredulously at the bare statement that gas could be made to give about double the light or illumination by such transmutation than could be obtained by burning it in an ordinary gas lamp or burner. Yet such is the fact, and it is capable of easy demonstration. Experimental tests, extending over a series of months, have been made to determine the amount of gas consumed by an Otto gas engine to produce a horse power of energy or work. From these tests it has been determined that to produce one horse-power net, an Otto engine will consume 21½ cubic feet of gas. We have now incandescent lamps by which we can produce from a horse-power 10 lights of 16 candle-power each. Now, as it requires a five-foot gas burner to produce 16 candle-power light, you can see that from the 21½ feet of gas from which we obtain the horse-power that develops 10 incandescent electric lights for one hour, we can only obtain four and a fraction over a quarter of 16 candle-power gas lights for the same time. It may be objected that the number of electric lights per horse-power is placed at too high a figure. I know it can be done, but let us say that only 8½ incandescent lights per horse-power is developed, and we still have double the illumination from the gas turned into electricity that we could get from it direct.

"Let us for a moment consider why this result can be legitimately achieved, and we will see that the thing is not so wonderful after all, but a legitimate result of the actual condition of things. What we call heat is a form of energy, but heat is not light always, and in the case of gas probably over two-thirds of the volume consumed is dissipated in the form of heat waves, while only about one-third is utilized in the form of light rays. The heat is lost for use in the gas burner, but it is the very thing that is utilized in the gas engine. Hence the result is altogether natural and legitimate. Indeed, if only a heating gas were used, I believe that a horse-power could be developed in a gas engine for an hour with from 15 to 20 per cent. less of volume of gas than in the tests which have been recorded. A gas engine, with a cheap gas supply—say, at from 50 to 75 cents per 1,000 cubic feet—is one of the most economical small motors that can be used, for it can be started up or stopped instantaneously, and when stopped it stops consuming gas. It can be easily controlled, is not dangerous, and with a small dynamo can be made to light a house more cheaply than gas. I need not add how much safer and better an electric incandescent lamp is than a gaslight in a room, summer or winter."

A large manufacturer desired to get an incandescent electric light plant for his mills, but thought the price charged for the installation was too high. The agent of the electric light company laid some stress upon the fact that the incandescent lamps would not heat or vitiate the air of the mills.

"Ah," said the manufacturer, "that with us is a considerable item in favor of gas—it saves us a great deal of fuel in the heating of our mills in the winter season."

They were cotton mills. The electric light agent quickly retorted by telling him that not only did the gas heat the air but dried it as well, and was therefore injurious to the proper manipulation of the cotton fiber, which required a certain amount of moisture in the air to enable it to be worked to advantage. He also pointed out the danger of these gaslights to the mill, when in operation, as under certain conditions of dry atmosphere, when the air would become charged with the fine dust of fibers, the mill was in danger of being set on fire by the flame from gas jets communicating to this dust, destruction of the mill being sure to follow. He likewise showed the manufacturer that not only was the health of his operatives injured by the use of gas, which consumed the oxygen and vitiated the air, but they were by such a process rendered dull and unable to do as much work as if the air was pure and good. All this the electric light avoided. There was no danger from foul or dry air, or from dust in the air, while as to the matter of economy he showed that the mills lighted with the incandescent light could be heated by the exhaust or waste steam, and the necessary moisture in the air easily maintained.

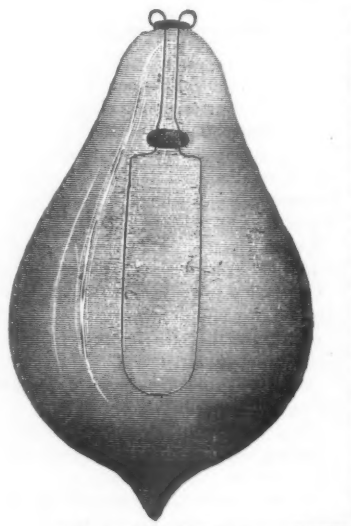

Fig. 4.—16 Candle-Power.

Fig. 6.—100 Candle-Power.

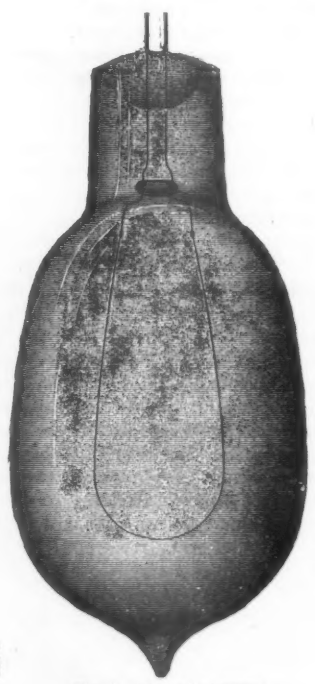

Fig. 5.—50 Candle-Power.

THE JENNEY INCANDESCENT LAMPS.

To Western Delegates to the Electric Light Convention.

The following announcement by the chairman of the executive committee of the National Electric Light Association, has just been issued, and should be responded to by every person interested in electric lighting who can make it convenient to start from Chicago:

"I have arranged for the transportation of delegates to the annual meeting of the National Electric Light Association at reduced rates, from Chicago to New York and return, and all who desire to join the party can secure their tickets from me, at $20 for the round trip, and good for 30 days. Two Pullman cars are provided, so that delegates may all go in a body, without change. The additional expense for sleeping car is $5 each way.

"Ladies may accompany the delegates on same terms. This rate is strictly confidential, and can only be secured by ordering tickets from me. The train will leave Chicago on Sunday, August 16, at 3:30 P. M., reaching New York City August 17, at 10 o'clock, P. M. I shall be at the Palmer House, Chicago, where delegates may see me and get all particulars, Sunday morning, August 16.

"It is hoped that all electric light men will avail themselves of these low rates and attend the convention, taking their wives with them.

"One parent company requests their friends not to attend the convention. No better reason can be given for your presence at this important meeting. Papers by eminent electricians will be read, important topics discussed, and valuable information gained. On receipt of this, please advise me promptly whether you will attend or not, and also your wishes in regard to railroad tickets. The Union Square Hotel reduce their rates to delegates. Respectfully,

"GEO. S. BOWEN,
"Chairman Executive Com."

The *Artisan*, of Cincinnati, one of our valued exchanges, very properly remarks: "All who wish to 'keep up with the times' in electrical progress must hustle around pretty lively, and read only first-class literature on the subject. To such persons we recommend the ELECTRICAL REVIEW, of New York, a weekly journal of electric light, telephone, telegraph, and scientific progress."

Mr. Geo. L. Wiley has taken charge of the business of the Standard Underground Cable Company, in New York. We predict that his extensive acquaintance in the telephone and electrical field will make it an easy matter to secure their share of the underground cable business.

The Jenney Electric Lighting System, of Indianapolis, Ind.

The illustrations accompanying this article will give the readers of the ELECTRICAL REVIEW an excellent idea of the style of the dynamo and lamps of the Jenney Electric Company, of Indianapolis, Ind Mr. Jenney, the electrician of the company, has originated many valuable improvements in electric lighting, after careful and intelligent investigation of both the arc and incandescent systems, and of high and low-tension currents. His conclusions are that for general use the incandescent, though superior for offices, residences and various kinds of factories, is not as economical and efficient as the arc light for lighting large spaces, and, in not affording daylight effect for distinguishing colors, is undesirable for certain commercial purposes; that there are many objectionable features in the high-tension arc system, the force of its current necessarily producing an unsteady and bluish effect.

The Jenney dynamo, Fig. 1, has been subjected to many severe tests, all proving the rare efficiency and economy with which it supplies the electric current. Its mechanical construction is the product of most thorough expert study and experiment, the best material being used, and only the most skillful workmen employed. The machine is compact, strong and durable. The magnets constituting its field of force are firmly bolted together, and the bearings of the armature as securely fastened as if the whole were made in one mould. The various parts are mechanically so constructed as to be interchangeable. One of its features is that it generates a large volume of low tension. A continuous current, free from vibration, is thus afforded. The expenditure of power is regulated by the number of lamps in use, and this expenditure is under the control of the operator, who can turn the lamps on and off at will.

The arc lamp, single and double, are illustrated in Figures 2 and 3. This lamp has recently been improved, for which patents were issued, and its inventor claims that it is the least complicated and one of the most reliable electric lamps in use. The changes and improvements are made after a study of the various lamps in use, and in the light of the most advanced scientific knoweldge. The insulation is of the best.

The shifting device of their double lamp, which lights the second set of carbons when the first set has been consumed, is very simple in form and positive in its action. By this system both single and double lamps can be used on the same circuit. Each arc lamp of the Jenney system, is provided with an automatic cut-out, which switches the lamp out of circuit when the carbons are consumed, or by any accident fail to feed.

The Jenney claims the only double automatic cut-out. Its construction is such that in case of poor contact at the cut out it prevents the burning up or destruction of the lamp, as frequently occurs with other lamps. A very important feature of this device is that it requires no extra mechanism, as it is operated and controlled by the feeding mechanism of the lamp. The lamp has no spring or adjustment devices. Its construction is such that it needs no adjustment.

The Jenney incandescent lamps, shown in Figures 4, 5 and 6, have given full satisfaction wherever used.

The Jenney Electric Company, of Indianapolis, Indiana, is composed of the following named gentlemen, who manage all its affairs: Daniel W. Marmon, President; Addison H. Nordyke, Vice-President; Brainard Rorison Secretary; Amos K. Hollowell, Treasurer, and Charles D. Jenney, Electrician. They are manufacturers and contractors for dynamo-electric machines, lamps and motors, electric lighting plants; their offices and works located at Morris street and I. & V. R. R. This company has recently issued a very attractive catalogue, and is evidently in the electric lighting field to do vigorous and effective work.

—— The new electric lights erected in the suburbs of New Orleans, are highly commended by the residents there.

—— The Ball electric light machine is meeting with fine success at the Croton aqueduct, where several of them are in use 23½ hours out of the 24.

—— The Secretary to the Board of Trade, in answer to a question asked in the House, has stated that Her Majesty's Government do not propose to undertake the consideration of the question as to the amending of the Electric Lighting Act of 1882 during the present session.

—— The Leeds Coliseum building, the near completion of which was signalized by the visit of the Prince of Wales a few days since, is well provided with the electric light. The contractors are Messrs. Cordner, Allen & Co, Limited, London. The system adopted is a combination of incandescent and arc lamps. The motive power is supplied by a 25-horse (nominal) engine, and boiler, made by Messrs. Davey, Paxman & Co., Colchester, and the dynamos are of the latest type constructed by Messrs. Mather & Platt, Manchester. For the lighting of the body of the hall seven arc lamps, are used. These are suspended from the roof—three down the center and two on each side. Eighteen incandescent lamps are placed in each of the two semi-circles forming the dress circle and the amphitheater. In front of the panels at the back of the saloon or ground floor and in the dress circle are 48 of these lamps. Each light is enclosed in a large opaque grape-shaped globe, which depends from ornamental brass brackets. The vestibule is lighted by a five-light electrolier and two double wall brackets, incandescent lamps being employed. The passages, retiring-rooms and refreshment rooms are lighted throughout with incandescent lamps. The installation is so arranged that every other lamp is on an alternate circuit, and in the case of the failure of one of the two dynamos, the lamps on one circuit will supply ample illumination for all practical purposes.

—— The Jenney Electric Company, of Indianapolis, has just issued a very attractive catalogue. Chas. D. Jenney is the electrician of the company.

—— The Prince of Wales favored the Hon. H. Bourke by visiting Nelville House, Esher, recently, and on the occasion the beautiful and extensive grounds were most effectively illuminated for the garden *fete*, a remarkable effect being produced by the illumination of the entire lake by electric light.

—— The Chinese Navy is adopting the electric light. A few days since three ironclads, which have been built for the Chinese Government at Stettin, arrived in Plymouth Sound, and considerable interest attached to their visit, seeing that they cost about a million and a half sterling. The turret ship, Chin Yuen, which is a vessel of 7,800 tons, is fitted with one large electric light in the forepart of the ship of 40,000 candle-power. The Ting Yuen is a sister ship to the Chin Yuen, and is fitted the same in every respect. The other vessel, the Tae Yuen, is of 3,200 tons, built of steel, and not armor clad. One mast is fitted with the electric light.

—— At the "At home" given by Mr. Thomas Cordes, M. P., at Hill street, Berkeley Square, London, Messrs. A. R. Sennett & Co. temporarily installed the electric light; upwards of 100 lamps being employed. The spaces lighted comprised the grand staircase (by means of a large electrolier and lamps hung upon tree ferns), the two drawing rooms (by means of lamps placed on the cornices, glasses, curtains, etc., the great ball room (by means of a very large crystal electrolier), and dining room. In the latter case the lighting was effected entirely by means of a number of 10 candle-power lamps, supported by the flowers used for the decoration of the supper tables. The electric lighting was much admired, and gave great satisfaction.

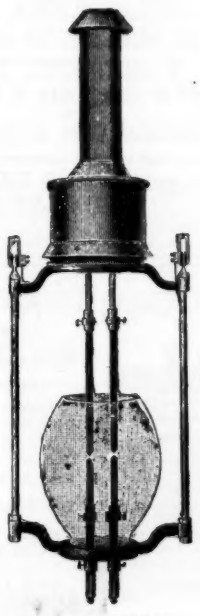

Fig. 2.—Double Lamp.

Fig. 3.—Single Lamp.

THE NEW JENNEY ARC LAMPS.

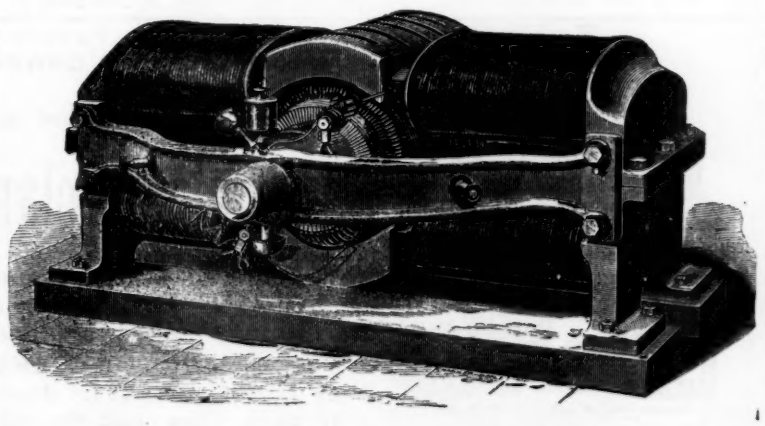

FIG. 1.—THE NEW JENNEY DYNAMO—FRONT VIEW.

ELECTRIC LIGHT NEWS

—— A week in New York, attending the convention and visiting the large electrical establishments of the city and suburbs, will well repay every electric light man, this month.

—— An employee of the electric light company, at Portland, Me., was knocked off a pole, he was in the act of climbing during a recent thunderstorm. He was carrying a coil of wire, one end trailing on the ground, and enough of a shock from the lightning was received by him to throw him to the ground, but no serious injury was experienced.

—— The principal feature in the Cruto incandescent lamp is the method employed to obtain perfect homogeneity of the filament. This is effected by depositing the carbon very gradually upon a core of platinum, about 0.0004 inch in diameter, raised to incandescence by the passage of a current while in the midst of a hydro carbon gas. The result is a carbon of great density, the pores of which are infinitesimal.

—— New Orleans is agitating over the question of city lighting for 1886. Time is valuable to the electric light companies, but not to the gas company. Its mains are already laid, and fifteen days' notice is ample time for them to thoroughly prepare their former territory for service. If delays still occur, the successful bidder for electric light will find the time until January 1, 1886, too limited in which to prepare a plant of such magnitude as 528 pole lights.

—— A series of experiments to show the practicability of flashing war signals at night by means of an electrically illuminated balloon, the invention of Eric S. Bruce, Esq., M. A., Oxon, will commence soon at the Albert Palace, under the personal superintendence of the inventor, who, after giving a short lecture accompanied by interesting explanatory experiments in the concert room of the building, will, by the aid of a captive balloon of some four thousand feet capacity, show the utility of his invention in the grounds. The balloon will ascend to an altitude of five hundred feet, and on a clear night should be visible fifteen or twenty miles away. Mr. Bruce's invention has excited much interest among the military authorities, many of whom will be present at the initial ascent.

—— The electric lights have thrown their rays on this heretofore darkened portion of Brooklyn for the space of one week and have given general satisfaction. Manhattan avenue was never before as brilliantly lighted as it has been during the past week, and the public are very much gratified at the service of the Municipal Electric Light Company, of which Charles T. Cooper is president, and James L. Jensen is treasurer. The only cause for complaint is in the distribution of lights, and in justice to the residents of Manhattan avenue, between Nassau and Norman avenues, (the longest block in the Seventeenth Ward), there should be another light in the center of the block. On Wednesday evening the lights were in operation on Fourth street for the first time, from Manhattan avenue to Williamsburgh, and it is time that Fifth street was similarly treated. For years Fouth and Fifth streets have been the scenes of midnight brawls and robberies. Crosstown cars have been stopped and the cash boxes stolen, and it was scarcely safe for any one to pass through either of the streets named after dark. The introduction of the electric light will put a stop to the business, as this class of thieves, as well as all others inclined to break the law, do not like light, rather choosing darkness, because their deeds are evil. Let the City Works Department at once place the lights on Fifth street direct to Greenpoint, and also on Franklin street, from the Bushwick creek to the Hunter's Point Bridge.—*Greenpoint Sun.*

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING JULY 28, 1885.

322,900 Marine torpedo; Angel Castro, New York, N. Y.

322,915 Electric switch; Leo Daft, Greenville, N. J.

322,916 Electric switch; Leo Daft, Greenville, N. J.

322,918 Cable recorder; Moses G. Farmer, Newport, R. I.

322,973 Circuit controller for combined district telegraph and domestic supply circuits; David Rousseau, New York, N. Y.

323,055 Insulator; Thomas McGrory, Philadelphia, Pa.

323,059 Regulator for dynamo or magneto-electric machines; Richard R. Moffatt, Brooklyn, N.Y., assignor to the Brooklyn Electric Construction Co., same place.

323,108 Dynamo-electric machine; Louis Bollmann, Vienna, Austria-Hungary.

323,134 Electro-magnetic speed register for ships' logs; Bernard Faymanville, San Francisco, Cal.

323,138 Electric railway; Oscar Gassett, Boston Mass.

323,150 Method of manufacturing incandescent electric lamps; Wm. Holzer, Harrison, N. J.

323,182 Electrical switchboard; Alexander C. Mather, Montreal, Quebec, Canada.

323,199 Electric Locomotion; John M. Pendleton, New York, N. Y., assignor to the Equitable Electric Co., same place.

323,203 Reflecting galvanometer; Robt. J. Pratt, Greenbush Heights, assignor to the Electric Mfg. Co., Troy, N. Y.

323,205 Manufacture of incandescent lamps; Albert L. Reinmann, Pittsburgh, Pa.

323,239 Means for preventing interference in combined telegraphic and telephonic systems; Francois Van Rysselberghe Scharbeek, Belgium.

323,241 Underground conduit for cables, electric wires, etc.; Wm. Walter, Philadelphia, Pa.

323,243 Electric railway signal; Albert G. Warren, Maysville, S. C., assignor of one-fourth to Alfred A. Strauss, same place.

323,269 Telephone circuit; Morgan Brooks and Howell R. Mason, Boston, Mass.

323,311 Telephone receiver; Charles L. Fortier, Milwaukee, Wis.

323,361 Commutator for dynamo-electric machines; Benjamin F. Orton, East Saginaw, Mich.

323,362 Armature for dynamo-electric machines; Benjamin F. Orton, East Saginaw, Mich.

323,363 Armature for dynamo.electric machines; Benjamin F. Orton, East Saginaw, Mich.

323,372 Carbon for incandescent lamps; Wm. Stanley, Jr., Englewood, and Edward P. Thompson, Elizabeth, N. J., said Thompson assignor to said Stanley.

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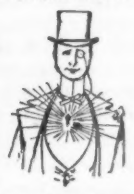

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